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The First Hundred Thousand

WHAT is the criterion by which the success of an electricity supply undertaking can be judged? Not merely profit, for many undertakings (some quite small) make a great deal of money by charging high prices, for people *will* have electricity for lighting at almost any price.

If all that is being said about public service is not mere cant, the proper answer, we feel, is the measure in which the supply has been made available to the people. In other words, the successful undertaking is the one which has sought the greatest good of the greatest number, and has put its supply within the reach of the houses and pockets of the great majority of the community which it serves.

The Birmingham Electric Supply Department has now over a hundred thousand consumers on its system; it is therefore entitled to be considered a successful undertaking. Birmingham is the first provincial city in England to reach the hundred-thousand mark; Glasgow, we believe, passed this point some time ago.

It is not merely the fact that the undertaking has connected up so many consumers that is of importance, for large cities have a large scope; it is the rapidity with which this figure has been reached that is the chief consideration. That much-abused adjective "phenomenal" may justly be applied to Birmingham's electrical progress.

Ten years ago—in 1921—Birmingham was supplying electricity to 13,500 customers; by 1926 this number had nearly trebled; and at the end of April last the total was 100,500. Thus the number of consumers has increased sevenfold in ten years. Moreover, during the year 1930-31 the number of additions to the mains (nearly 19,000) exceeded the connections made during the first 23 years of the Corporation's ownership of the undertaking, dating from 1900.

The degree of electrical development in the city may be gauged from the following figures. The population of Birmingham is in the neighbourhood of a million, and as it is usually assumed that the average household comprises five persons there should be about 200,000 households in Birmingham. If this is correct, it would appear that half of them are customers of the Electric Supply Department. There are, of course, several correcting factors which a stricter survey would have to take into account—such as the number of industrial establishments included in the number of consumers, and the probable decrease in the size of the average family.

Nevertheless, the fact remains that Birmingham has reached a stage of development which is remarkable for a large city and it is interesting to note that this has been achieved in spite of the strength of the gas undertaking, which is also under municipal ownership.

Electrification has not only been widespread, but intensive as well; the consumption per head of population has reached a very good figure.

To what can the rapid growth of electricity supply in Birmingham be attributed? To nothing more than the pursuance of the methods which we have advocated for many years past; they may be summarised as follows:—Reasonable charges; assisted wiring; hire and hire-purchase schemes; anticipation of the demand; "service"; and intelligent (and intelligible) propaganda. These may be termed the cardinal principles for success in electricity supply and Birmingham's record is a remarkable testimony to their soundness.

By these methods the effects of the economic depression upon the industrial section of the load have been very largely offset, for the domestic load continues to expand at a very satisfactory rate.

In calling our attention to the attainment of the first hundred thousand consumers, Mr. E. J. Jennings, the secretary and commercial manager of the Department, says that the advance has been due in no small measure to the Corporation's policy of wiring all the municipal houses. We may add that another potent factor has been the energetic policy pursued by the commercial side of the undertaking under the leadership of Mr. Jennings.

Who will be the next to reach six figures? Leeds appears to be the most likely, but Liverpool, Manchester and Sheffield are all in the running.

Urban Transport

THAT tramcars, trolley 'buses, and petrol 'buses have their own fields of usefulness is, we believe, generally accepted. There is, however, pronounced disagreement between their partisans in delimiting these fields. Considering the magnitude of the sums involved, decisions to adopt one type of vehicle or the other appear to be made in a curiously arbitrary manner and we suggest that the co-ordination of the available data and the collection of further information could very usefully be undertaken by the Tramways, Light Railways and Transport Association co-operating with the Municipal Tramways and Transport Association. We must agree with Mr. C. J. Spencer that our method of approach to the subject is most unscientific and compares most unfavourably with that of other countries. We agree also with Mr. R. S. Pilcher that the transport manager must provide the type of vehicle the public prefers. He says that the public obviously chooses the motor vehicle. It is the duty of those who wish to retain a load of 900 million kWh for our electric power stations to see that the motor vehicle for urban transport is an electric-motor vehicle, whether it be a tram or trolley 'bus.

Railway Operation

A LARGE proportion of the total savings anticipated through main-line electrification in Great Britain are due to a more efficient utilisation of labour. It is, therefore, gratifying to learn that in the eighteen months' operation of the electrified Great Indian Peninsula Railway (on which conditions are far more onerous than they are likely to be in this country) no difficulty at all has been experienced in training men for the work who had hitherto been accustomed to steam operation. Another outstanding fact is the very low maintenance cost of the electric tractors compared with that of the superseded steam locomotives. The cost of repairs may be regarded as an indication of relative reliability.

Modernise the Foundry

Too little consideration is given by many supply undertakings and manufacturers of electrical equipment to the possibilities of the foundry as a source of load. The attitude may have been bred by the indifference with which some manufacturers appear to treat this important part of any works, as is more often than not indicated by the casual reference and dismissal—"that's the foundry over there"—during organised works' visits. The electric crane is the outstanding exception, but there are a hundred-and-one other possible uses for electricity in which the foundryman could be interested; heating, sand-mixing, cartage and cleaning are a few. The problem is one that concerns most supply engineers, as there are few towns of any size nowadays that have not at least a few foundries thrown in to make up their industrial life. The load too would be of a useful kind, for, in normal times at any rate, much of the foundry work is done at night. The question is another reminder that in the great drive for the domestic load the supply man should not neglect the industrial side.

Ships' Auxiliary Plant

ALL the orders of any importance placed with shipbuilders within the past two months, numbering not more than a dozen in the whole of Europe, have been for vessels propelled by internal-combustion engines. Since in times of depression the demand for maximum efficiency naturally becomes more insistent than under normal circumstances, the significance of the fact that such ships are invariably provided with electrical auxiliary machinery needs no emphasis. It was therefore with admiration for their boldness that we read of Mr. O. E. Jorgensen's suggestions to the Institute of Marine Engineers. Briefly, he advocates the elimination of electrical auxiliary plant altogether and with it the marine electrician also. Contending that electrically-driven deck machinery represents a substantial addition to the cost of a motor-ship, as compared with that of a steamship, he offers in place of electric winches machines operated by compressed air. As the author has already been taken to task during the discussion on his paper, it will suffice for us to associate ourselves with the *Motor Ship's* exposure of the fallacy of his assumption that the duplication of electrical auxiliaries is an expedient dictated by the need for reliability. No! Mr. Jorgensen's proposals are far too sweeping to be wholly justified, and the attractiveness of simplicity alone is not sufficiently tempting bait.

Good Battery Business

BRITISH manufacturers of primary batteries and small accumulators are to be congratulated upon the prosperous state of their particular section of the electrical industry. The output figures of all of such producers are not available, but such as have been reported to us make us wonder how many millions are being turned out annually to meet the needs of the motoring, radio-listening, and pocket and portable lamp-using public. Though we are passing through exceptionally hard times, one company (the Ever-Ready) finds works extension continually necessary in order to keep pace with the heavy increase in demand. The chairman told shareholders on Monday that the estimated consumption of primary batteries of all types used in this country was 20 per cent. larger than that of the previous year. Notwithstanding this the official returns show that in the same period the imports fell by 15 per cent. The public use of primary dry batteries has been growing during the past 20 years in many walks of life and it is expected to do so.

The E.A.W. International

Two years ago at Newcastle-upon-Tyne the Electrical Association for Women held its first conference outside of London, when representative women from other countries read papers that had considerable technical interest, as our readers will recollect. It thus had an international character, in the same way that this week's conference has. The papers on the present occasion relate to electrical development in France, Sweden, and Denmark, with particular reference to the education of women in the intelligent use of electrical appliances. Anyone can, of course, use such appliances with a certain amount of satisfaction to themselves, but it is well worth while to study how to obtain the utmost benefits at the lowest possible cost.

Capt. J. M. Donaldson, M.C.

Nominated as President of the Institution of Electrical Engineers for the 1931-32 Session

TO most of our readers the name of Capt. John Muir Donaldson is associated with electricity supply on a big scale, since for nearly eleven years he has been chief engineer of the North Metropolitan Electric Power Supply Co. As he had been with that company for 14 years previously, and had also spent a period of some twelve months with the Montreal Light, Heat & Power Company, his total experience of the supply section of the industry totals some 26 years, if we include an interlude of some four years war service. Actually, Capt. Donaldson represents very much wider professional interests than might be indicated by his more recent activities, since he has also spent many years on the manufacturing side of the electrical industry.

Born on October 21st, 1877, at Kenley, Surrey, he received his early education at Whitgift Grammar School, Croydon. His technical training started in October, 1894, when he entered Finsbury Technical College, spending two years in the physics department and securing the Huxley scholarship (tenable for three years at the Central Technical College) awarded by the Fishmongers Company. After 2 years at the latter institution he obtained the college diploma, A.C.G.I., and the Siemens Memorial Medal. Later he gained the Students' Premium of the Institution of Electrical Engineers. On leaving Finsbury in 1898 he joined the British Thomson Houston Co., Ltd., where he remained for three years in the engineering department at Cannon Street under Mr. Eustace Thomas and, later, under Mr. Frank Wallis. This was followed by a spell of work in Schenectady, U.S.A., where he gained experience in the testing and foreign departments of the General Electric Company, and in Canada with the Montreal Co., as stated above.

In 1904 Capt. Donaldson returned to England, rejoining the B.T.-H. Co. to handle switchgear on the commercial side of its traction and lighting departments at Rugby. His next move was to the "Northmet" as technical assistant to the engineer-in-chief.

In September, 1914, he "joined up" and obtained a commission as captain in the K.R.R.C. (16th Batt.) At the battle of the Somme he secured that coveted distinction, the Military Cross, but was at the same time incapacitated for further duty at the front. After a sojourn in hospital he was still able to perform useful military service as instructor to the 1st Cadet Battalion of the R.F.C. (afterwards the R.A.F.). In November of '18 he resumed his civil duties with the "Northmet," and in 1921 was appointed to the position he still holds. Though the office may carry the same title now as then, it is quite evident from the following comparative data that the scope has been very greatly increased.

Capt. J. M. Donaldson, M.C.

	1921.	1930.
kW installed in power stations	32,390	106,100
Consumers connected ...	8,056	72,537
kWh generated	65,113,000	236,569,000
kWh sold	58,926,000	228,663,000
M.D. on system, kW ...	24,397	95,350
Lb. coal per kWh generated	2.68	1.71

The plant installed in 1921 included that at Brimsdown, Willesden, Hertford, and St. Albans power stations. The last two, together with a small station at Stevenage subsequently acquired, have now been closed down and the total for 1930 includes only the plant at Brimsdown "A" and "B" and Willesden—all "selected stations" under the grid scheme.

With regard to the provision of the load for these generating stations, we need do no more here than refer to the account of the progressive policy of the "Northmet" which was published recently in these columns.* Capt. Donaldson's interest in this aspect of electricity supply is further indicated by his work for the Electrical Development Association.

The particulars given above do not cover all Capt. Donaldson's professional duties. He has been chief engineer of the Bedfordshire, Cambridgeshire, and Huntingdonshire Electricity Co. since its inception in 1925. This company is a quasi-power company associated with the "Northmet" Co. and operates in the counties named, although only a small portion of Bedfordshire falls within its area. At present supply is taken from Bedford through the first section of the grid to be placed in commission and the first in England to be made alive at 132 kV. The load has not yet grown to large dimensions, but the load factor is close on 40 per cent.; the demand last year was 3,500 kW and some 12 million kWh were sold. The initiation of this company is of particular interest in the insight it gives into an engineering mind. Capt. Donaldson with an eye on future developments was prospecting for a power station site in the north of his company's area. There proved to be nothing suitable nearer than the River Ouse on the border line of Bedfordshire and Huntingdonshire—a considerable distance from the boundary of his territory. In the course of his investigations Capt. Donaldson observed that there was no public supply whatever in Huntingdonshire and very little in Cambridgeshire, so he recommended the acquisition of statutory powers to supply in these virgin districts in addition to securing the site for the Little Barford power station, which has now been scheduled as a future "selected" station under the South-East England Electricity Scheme. Apart from his specialised duties of a technical character Capt. Donaldson has played an active part in the promotion of the interests both of his profession and of the electrical industry generally. We have referred above to his connection with the Electrical Development Association; he was chairman of the Council in 1929/30 at the time when the late Dr. S. Z. de Ferranti was president, and during his term of office a committee was set up to report on the possibility of securing the general adoption of a two-part tariff with a uniform low secondary charge.

The application of the Whitley Council principle to the electricity supply section of the industry has proved so outstanding a success that all those who have contributed towards this end may be regarded as having performed an important public service. For about five years (until about two years ago, when pressure of work compelled his resignation) Capt. Donaldson was one of the representatives of the Power Companies Association on both the National Joint Board and the National Joint Industrial Council. He has also been for nearly 10 years a representative on No. 10 J.I.C. (*i.e.*, the London district) for the Provincial Electric Supply Corporation, relinquishing this position only a month or so ago.

On the London and Home Counties Joint Electricity Authority he represents the power companies.

Capt. Donaldson is a member of the Institution of Civil Engineers. He joined the Institution of Electrical Engineers in 1898 and became a Member in 1912. He became a Vice-President in 1927 and now, on his succession to the office of President in this year of the Faraday Commemoration, we desire to join with all other electrical engineers in offering him sincere congratulations.

* ELECTRICAL REVIEW, July 11th and 18th, 1930.

Secondary Distribution

The standardisation of voltage and frequency will provide opportunities for redesigning cable networks to secure the most economical working

By G. H. ADAMS, B.Sc., A.M.I.E.E.

AN examination of the British Electricity Commissioners' Annual Report for the year ended March, 1929, shows that of a total of £297,677,012 expended up to that date, 59 per cent. or £175,555,449 had been expended in distribution and 41 per cent. on generation. The capacity of generating plant installed amounted to 5,801,770 kW, and the maximum load on all generating stations was 3,369,166 kW. From these figures we see that the capital expended in generation was £21.1 per kW installed, and £36.2 per kW of maximum load. In distribution these figures were £30.2 and £52.1, respectively, from which the relative importance of distribution costs becomes clear.

The figures for generation will show an appreciable reduction under the centralised control of the Central Electricity Board, mainly owing to a pooling of reserve capacity, increased station efficiencies, the lower cost per kW of larger stations, and economic sharing of load. A point will be reached, however, beyond which it will be difficult to show improving results, owing to the limit of efficiency possible with the steam turbine, a probable limit to the economic size of generating station, and a definite limit to the reduction of standby plant which will be deemed advisable. A reduction in distribution costs is therefore to be desired.

Load Centre of Gravity

Undertakings receiving supply in bulk may find that the point of supply is not at the centre of gravity of their load, and a reduction in costs may result from transmitting to that centre at a higher voltage. The secondary distribution system from that point must be designed for ease of extension, and be capable of supplying all sizes and types of load as the demand arises. An industrial load may have to be supplied in an area mainly requiring lighting, and should preferably be fed from the h.p. system rather than from a l.p. network, in order to obviate voltage regulation difficulties and flickering lights over that particular l.p. network area. This is of importance in a residential area, because a 5 per cent. decrease in the applied voltage results in a decrease of 15-20 per cent. in the illuminating power of metallic-filament lamps, while a 5 per cent. increase in voltage shortens the life of a lamp by about 60 per cent. Sharp voltage variations also tend to deteriorate lamps and cause inconvenience to the consumer.

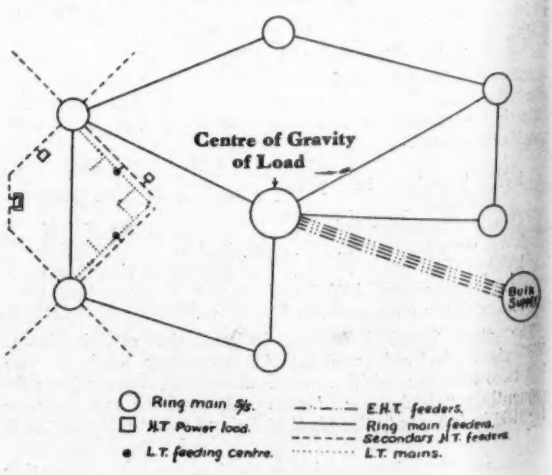
New networks must be arranged for finally superseding the existing systems, and care should be taken to see that short-circuit currents are reduced by sectionising, or by limiting the size of transformers feeding into sections of l.p. network. This question will be found to be linked up with the decision as to the most economic size of transformers, their economic spacing, and the size of l.p. distributors employed. If the distance between transforming centres feeding the l.p. network is too great, the size of l.p. feeders necessary to satisfy voltage regulation requirements and current carrying capacity becomes too large and unwieldy for jointing. In this case the saving in the cost per kVA of transformers, transforming centres, and annual magnetisation losses of the transformers will be offset by an increased cost of l.p. cables, increased copper losses in the l.p. distributors, and increased cost of jointing work on the larger cables. On the other hand, too close spacing of transforming centres, while giving a reduction in the cost of l.p. cables, results in increased cost per kVA of transforming centre and higher magnetising losses. The shape of the area under consideration will also be found to have a bearing on the spacing of feeding centres, a rectangular or straggling area requiring more and smaller transforming centres than a square-shaped compact area. The safe rupturing capacity of switches and fuses must not be exceeded, and trouble is possible from this cause if a small consumer is connected to a l.p. feeder supplied from a large bank of transformers nearby. From this it will be seen that the economic choice should be made after taking these factors into consideration.

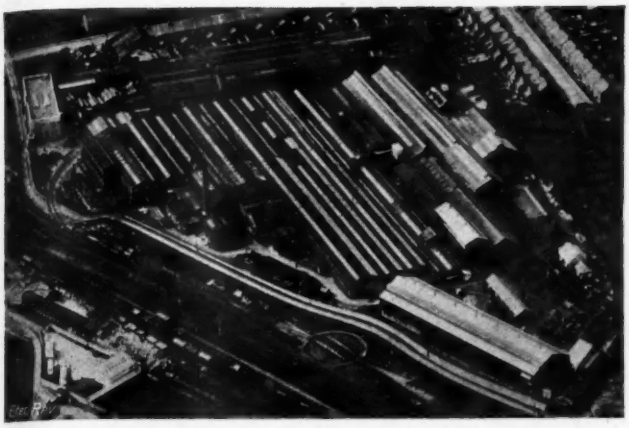
The Interconnected System

The type of h.p. network most generally favoured is the ring-main interconnected system; while such a system is flexible and suitable for the application of protective gear there are disadvantages if all h.p. feeders in the area are thus linked up. Amongst these are the increase in the short-circuit kVA on the occurrence of a fault, with the corresponding increase in the cost of switchgear of requisite rupturing capacity. Further there is a limit to the number of sub-stations which can be fed on any one ring, without running further interconnectors or doubling the ring feeders, because only two ends of a ring main enter the main feeding centre. The total connected sub-station capacity on any ring is therefore limited to twice the capacity of a single h.p. feeder. Thus any ring with several sub-stations already connected is not suitable for picking up isolated power consumers with motor loads, although the h.p. cables may pass within a few yards of the building to be supplied. This inability to tee-in cheaply off a h.p. ring main to supply the smaller power loads defeats the advantage claimed of covering as great an area as possible with the ring. When such a network of h.p. cables is relied on solely, a further tendency is for the economic spacing of transformer centres feeding l.p. areas to be exceeded. Having already provided a building suitable for housing the switchgear of the ring-main sub-station, the natural tendency is to supply as large a l.p. area as possible to justify the expense of the sub-station. The resulting distribution in that area is then likely to develop on the lines of the old d.c. systems with heavy l.p. feeders and increased line losses. Difficulties of voltage regulation also arise, which cannot be dealt with as in the d.c. case without the additional cost of expensive automatic voltage regulators. The great advantage of a.c. distribution is thus lost, which should be found in ease of feeding into a light l.p. cable network at the most suitable points.

The High-pressure Feeders

Considerations such as the above have led, in some cases, to a lower medium pressure network, but the disadvantage of secondary transformation can be overcome if a layout be adopted as shown in the diagram above. This shows an interconnected h.p. system from the main sub-stations of which h.p. cable of smaller section can be run at the same h.p. voltage as the main system. These feeders controlled by automatic circuit breakers with leakage protection at the main sub-stations can be tapped at any point to supply a h.p. consumer or to feed into the l.p. network at economically suitable points. Oil isolators, or non-automatic oil switches, are the only h.p. gear required at these transformer centres, and in the case of underground chambers the h.p. feeders can be jointed up direct to the transformer terminals. In this case it would be advisable to have a push-button control to trip the main circuit breaker at the sub-station in case of an accident. By so arranging the routes of these h.p. feeders, l.p. areas fed from one main can be made to feed areas supplied from another in case of failure of any feeder. Continuity of supply to the l.p. network will be ensured if the transformers have l.p. breakers fitted with reverse-power relays which disconnect the l.p. network from all transformers fed off a faulty h.p. feeder. The secondary h.p. feeders can be taken in and out of several of the larger transformer centres in order to provide possible means of sectionising in the event of a h.p. failure. An isolated h.p. consumer whose requirements do not warrant a tee off a second feeder need therefore be without supply only for a short time in the event of a cable fault.





Electricity in Modern Engineering

The up-to-date methods of power driving, industrial heating, etc., have been adopted in a large railway signalling works, in each case after exhaustive tests to ensure an economical proposition

THE Railway Signal Works at Chippenham of the Westinghouse Brake & Saxby Signal Co., Ltd., affords one of the best examples in this country of the use of electricity in a large modern engineering factory, the newer methods being used for practically all the process requirements, including extensive industrial heating, in several cases after conversion from steam and gas working. The change-over to full electricity usage has been the result of a carefully designed reorganisation scheme carried out in progressive stages during the past seven years, and in every case the results of the installation or conversion have justified the initial move. The works is devoted mainly to the manufacture of railway braking and signalling equipment and metal-oxide rectifiers, examples of the company's recent introductions being the centralised system of railway traffic control and the eddy-current rail brake, ELECTRICAL REVIEW, April 24th and May 1st, pp. 730 and 771, respectively. The accompanying illustration of an all-electric power frame is an excellent example of the firm's railway signalling products. In this equipment all mechanical interlocking has been eliminated, and it is typical of several that are in use on the Southern Railway. Such equipment, electric point machines, and generally the heavier types of electrical railway apparatus produced are assembled in a special large and well-appointed shop. The factory buildings cover about 9 acres of ground and are situated adjacent to, and are served by sidings from, the main Bristol line of the G.W. Railway.

There is nearly 2,000 h.p. of motors installed, in addition to about 300 kW of industrial heating load. The maximum demand is in the neighbourhood of 1,060 kVA, and with a working night shift, partial and not completing the 24 hours, the load factor for the whole electrical installation is round about 36 per cent. Something like a quarter-million kWh is consumed per month.

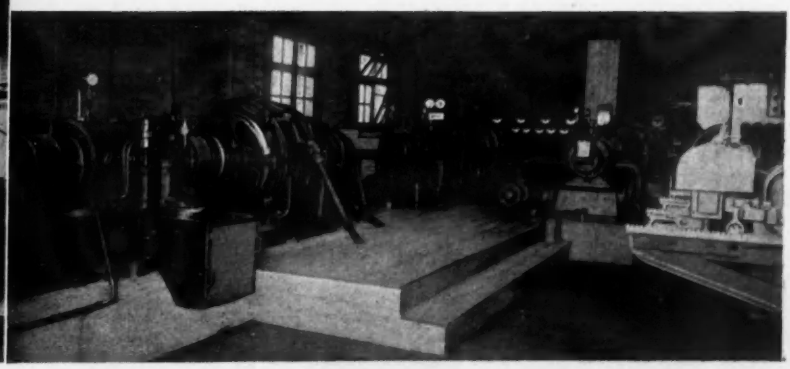
The electricity supply, generated at Bath, is received from the West Wilts Supply Co. in the works sub-station at 11,000 V, 3-phase, 50 cycles, and it is reduced to the working pressure of 400/230 V by three 500-kVA Hackbridge transformers connected delta-star. Reyrolle switchgear serves both the h.p. and l.p. sides of the transformers. The distribution system throughout the works is laid out in simple and efficient manner. For power single-wire armoured and braided cable is used, paper insulated up to the "Aeroflex" distribution boards and v.i.r. to the motors and control gear. For the lighting the "Kaleeco" system of Callender's Cable & Construction Co., Ltd., is adopted, from "Cantie" distribution boards. With comparatively few exceptions Wardle industrial lighting fittings are used throughout. In the pattern-making and tool shops there are some excellent adjustable "Dugdill" fittings which may be described as truly "universal," and which have very easy but quite definite movement.

A good deal of compressed air is used in the factory, and advantage is taken of this for power-factor correction. In the sub-station are three rotary compressors, each capable of delivering 500 cu. ft. per min. at 100 lb. per sq. in., driven in each case by a 108-h.p. "Crompton" auto-synchronous motor designed to run at 0.7 leading power factor. Each compressor is fitted with a clutch, so that one or more of the machines can be run as synchronous condensers without driving the respective compressors. The air from the compressors is passed through an air cooler and a water separator before it is conveyed to the shops.

All-electric Power Signalling Frame

One of the most interesting conversion schemes in the works is to be seen in the stamp shop where there are 20 Bretts friction-lift drop hammers arranged in seven batteries, which machines were originally steam driven. Electric driving has been adopted and each battery is driven by a 40- to 80-h.p. "Emcol" motor mounted on a platform supported on the girder uprights about 10 ft. above the floor level and 4 ft. below the overhead driving equipment. Belt power transmission is employed, and for the actual lift a clutch operated manually by a rope from the floor level engages with V grooves in the lifting pulley. The clutch is disengaged

Electric Drop Hammers



Works Sub-station; Air Compressors driven by A.S. Motors

Magnetic-chuck Machine; Rectifier Supply

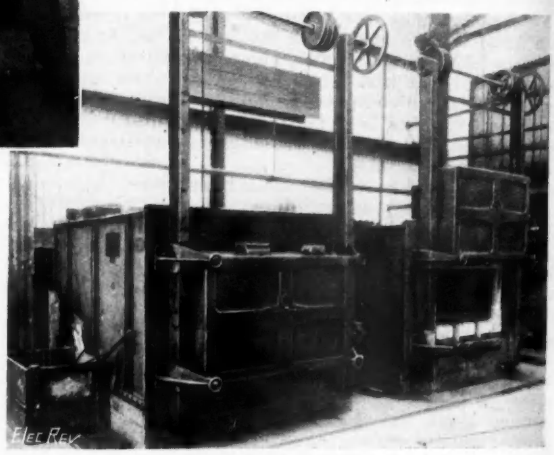
Butt Welder Working

equipment in this shop is two resistance furnaces by the Electric Resistance Furnace Co., Ltd. They are used for normalising and carburising work at up to 950 deg. C., and are heavy-wire wound to give a loading of about 20 kVA for each furnace. A further interesting machine in this department is a 40-kW butt welder which will deal with up to 1¼-in. diameter rod.

An excellent example of workshop driving, considered as a whole, is that in the machine shop, in which a standardised scheme employs 40-, 20-, 10- and 5-h.p. Metropolitan-Vickers s.c. ventilated motors throughout, with Brookhirst starters Auto-transformer starters are employed for the largest motors. star-delta equipment for the 20- and 10-h.p. machines, while direct-on switching is employed for the smallest motors. Wherever possible the drives are kept overhead, the motors being bolted to the girderwork and the starting equipment located at the floor level with similar fixing. A number of magnetic-chuck machines for grinding, planing and similar operations may be seen among a particularly wide variety of machine-tools in this section of the factory, and for the magnet supply to these the company has taken advantage of the facilities offered for d.c. supply by its metal rectifiers. The d.c. loadings of these machines vary from 0.5 to 3 A at 200 V, and the rectifiers provide individual machine supplies and are usually fixed vertically on the girder supports.

Synthetic-resin mouldings are used extensively in connection with the products of the organisation, and there is much of electrical interest in the "Bakelite" shop. The main equipment consists of twelve hydraulically-driven presses made by John Shaw & Co., Ltd., varying in capacity from 3 to 100 tons pressure. The presses are electrically heated, "Morganite" elements embedded in lead being housed in the platens The loadings vary from about 1.5 kVA for the small presses to 4.5 kVA for the 100-ton equipments, and the press heads are connected single-phase. Automatic temperature control is obtained by the use of "Budenberg" vapour thermometers, the contacts of which operate Hart automatic switches. The working temperature of the presses is usually about 350 deg. F., but the thermometer settings can vary from 250 to 400 deg. F. Three of the presses are semi-automatic and equipped with cylinders which eject the mouldings. Where large quantities of mouldings are required the powder is first preformed into tablets of the correct size and weight by means of a special machine. The electrical heating of these presses has proved a very economical practice. The hydraulic plant is installed in the same room, and the accumulator is served by a 10-h.p. motor-driven pump. The accumulator is fitted with automatically under gravity at the required position of the hammer. A feature of the contacts so arranged that the pump is automatically started when the accumulator commences to fall. A point of interest is that the Westinghouse Co. makes its own moulds.

A relay shop is devoted to the production of small transformers, relays, armatures, field coils, small motors and light electrical parts, and there is the usual complement of bench winding and taping machines, &c., with numerous fractional h.p. motors. Of greater interest, however, are electrically heated impregnating plant and industrial ovens. A 1.5-kW impregnating equipment uses oil as the heat-transmission medium, three equally loaded immersion heaters being housed in the oil jacket around the container. The heaters are thermostatically controlled for working at 100 deg. C. An oven employed for drying coils has been converted from steam to electric working by the Westinghouse people. The scheme provides nickel-chrome elements wound on micanite and brass rod and connected two in parallel on each phase. The total loading is 3 kW, and the three pairs of elements are star connected and left on

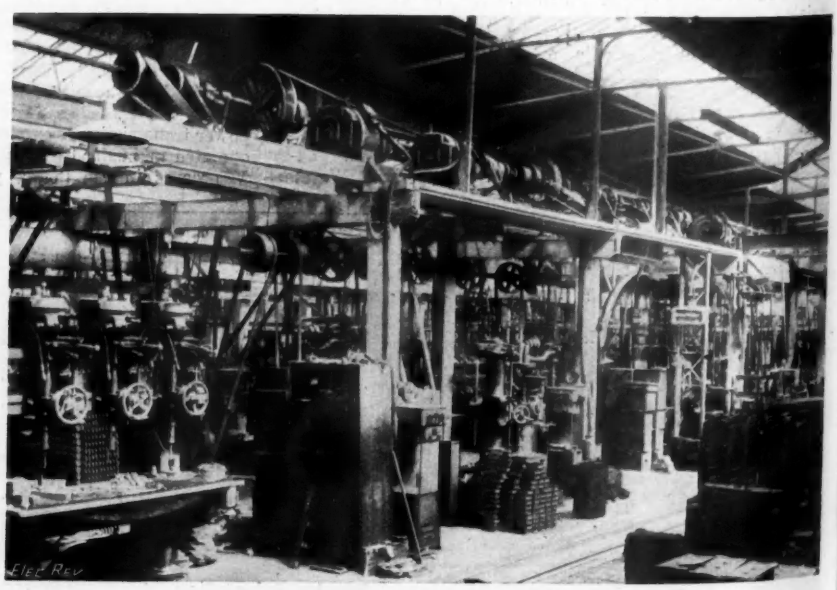


Carburising Furnaces

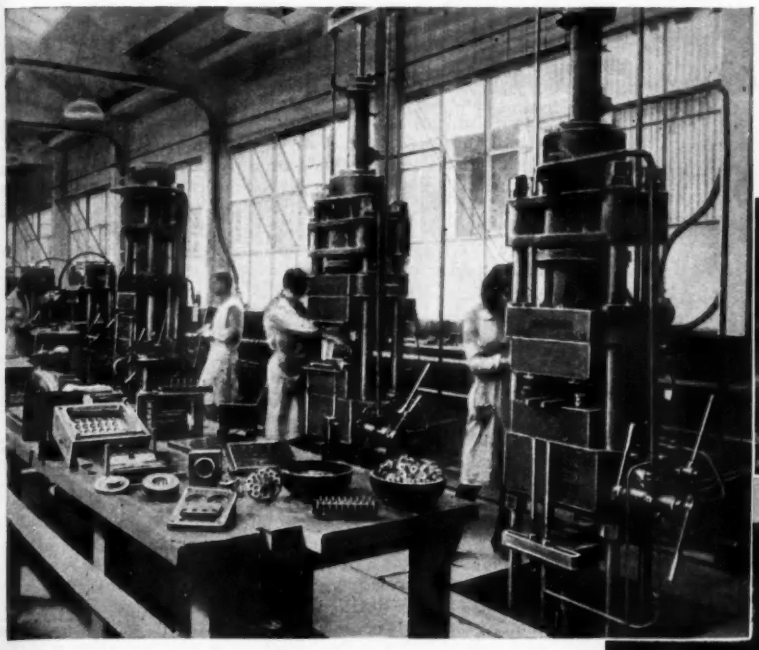
circuit continuously with thermostatic control by means of a Cambridge dial thermometer and a relay. There is also a number of furnaces which have been similarly converted from gas working with equally satisfactory and beneficial results.

Electro-plating with nickel, copper, tin, &c., is carried out in a fully equipped and well laid out plating shop, an interesting feature of which is the supply arrangements. The necessary 10-V d.c. is obtained from an 8-kW metal rectifier of the company's make connected up to the 400-V, three-phase mains through two Ferranti transformers, 400 to 12 V.

In the tool shop there is a Wild-Barfield 7.9-kW resistance furnace automatically controlled by the makers' electro-magnetic critical-point indication equipment. Another item of interest in this shop is a couple of old-type W.B.



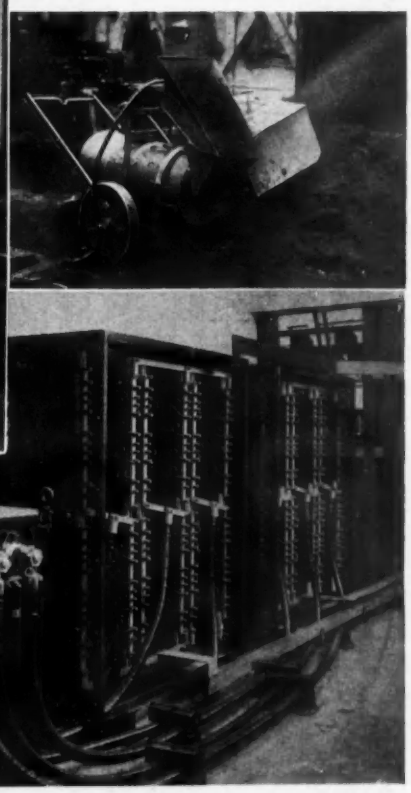
Driving Arrangements in Machine Shop



Electrically-heated "Bakelite" Presses

furnaces which have been fitted with elements by the Company for a loading of 4 kW each. These furnaces are each controlled by a simple but very effective device in which two metal pieces touch under expansion and close the operating circuits of a mercury switch which, in turn, closes the main contactor.

We do not often have the opportunity to refer to the use of electricity in a foundry, at any rate on anything like an extensive scale. The large foundry at Chippenham is served by two 4-ton and one 5-ton electric overhead cranes made by Royce and Co., Ltd. These are a.c. operated and are each fitted with a special low-speed device for use when drawing patterns from the moulds. On each 4-ton crane the hoist, travel and traverse motors are of 15 h.p., 470 r.p.m., 7.5 h.p., 960 r.p.m., and 2.0 h.p., 680 r.p.m., respectively. The corresponding figures for the large crane are 20 h.p., 575 r.p.m., 7.5 h.p., 690 r.p.m., and 2 h.p., 680 r.p.m. The travelling speed of all the cranes is 120 ft. per minute, and all the motors are slip-ring machines. Several electrically-driven portable sand-mixing and conditioning machines may be seen in the foundry. A hopper with a sieve bottom is agitated by means of a small-throw eccentric on the motor shaft beneath. The 5 h.p., 400-V, 3-phase Newton motor also drives an impeller immediately beneath the sieve, so that sand falling through the mesh is caught on the impeller blades and projected at an angle of about 45 deg. and for a distance of, say, a dozen feet. For the supply to these machines there is a number of plugs arranged at suitable points



Top, Sand-mixer; Bottom, Rectifier for Plating Shop

around the foundry, and the mixers are fed by c.t.s. trailing cables. The machines were made and supplied by the Coleman Foundry Equipment Co., Ltd. For the crucible furnaces and the smithy are installed some Roots' blowers, the working portion of each of which consists of two large blades after the style of an aeroplane propeller which revolve about each other with particularly fine clearances. Each blower is driven by a 40-h.p. M.V. motor. Sand grinding is effected by two special machines, a 20-h.p. motor serving both grinders. Some large core-drying ovens are served by a small directly motor-driven Sirocco fan. In the pattern-making shop there is a good deal of electrically-driven woodworking equipment, including some interesting "built-in" machines. For example, a Wadkin planer driven by a ¼-h.p. motor has proved a very economical proposition.

General View of the Foundry

Of outstanding electrical interest in the works as a whole is the manufacture of metal-oxide rectifiers, both because of the importance of the development to the industry as a whole and because of the extensive use of electricity in the production. It will be recalled that the Westinghouse rectifier in its simplest form consists essentially of a copper disk oxidised on one side. The oxide film resists the passage of current in one direction, but permits a free flow in the opposite direction. The disk, or any required number, is assembled on a screwed belt with suitable spacing washers, insulation, radiating fins, &c. In manufacture the disks are blanked from copper strip in electrically-driven presses. They are then cleaned before being subjected to dual heat treatments in high- and low-temperature electric furnaces in order to obtain the necessary oxide. As the oxide is required on only one face of each disk, they are

placed in the furnaces threaded on rods in pairs, back to back. The result of this treatment is the formation of two oxides, red and black, only one of which is required. The black oxide is removed by chemical treatment, after which the disks are

Furnace Equipment in Rectifier Shop

swilled, cleaned and dried, and then treated with graphite on an automatic rubbing machine in order to get a good face on each disk.

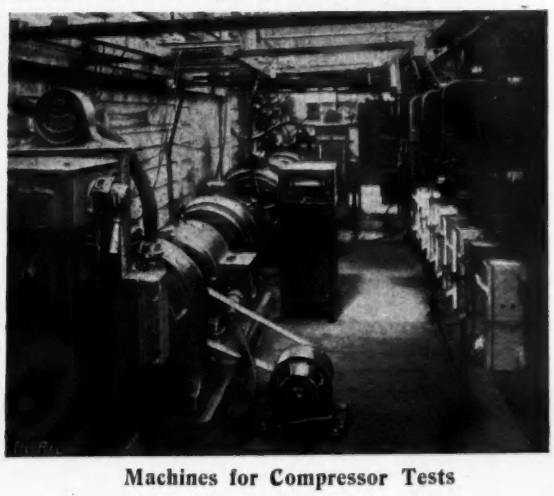
The testing of the disks before assembly is one of the most important processes in the manufacture of the rectifiers, and this is carried out on four automatic machines specially designed and built by the company for the purpose. By an ingenious arrangement and manipulation of relays and compressed-air valves the disks are tested for forward and reverse resistances, and the "duds" are separated from the good disks.

There are eight electric furnaces in the rectifier shop, arranged in pairs, high and low temperature, all supplied by the Electric Resistance Furnace Co., Ltd. The h.t. furnaces are loaded at about 20 kW, and the l.t. equipments at about 7.5 kW. Four are potentiometer controlled by Leeds and Northrup apparatus, and the remainder by Cambridge equipment. The elements of each furnace are star connected. To provide for the ageing of the elements they are supplied through tapping transformers, so that the supply voltage can be altered when required. There are two pilot lamps on each, red for the external and green for the internal circuits. At the back of each oven are a silver and gold heat fuse arranged in the no-volt circuit and a thermo-couple for the temperature control. The furnaces are left on circuit continuously under normal working conditions, and the lagging is so good that for each large furnace the heat loss is only 8 kWh per hour

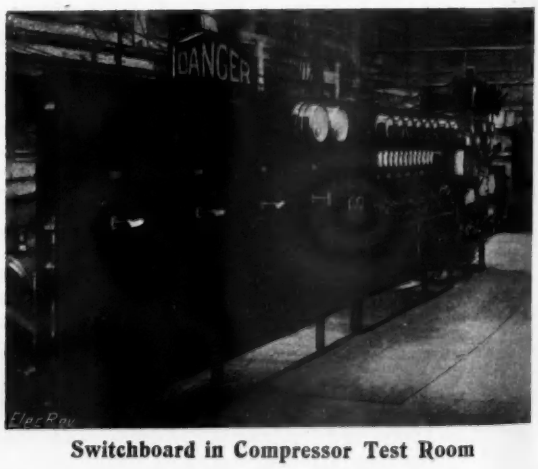
In the assembly room the rectifier disks, with the washers, cooling fins, &c., are made up into the required units for all manner of apparatus, including supply equipments for all purposes with up to 10 kW outputs.

There are two main test rooms in the works, one devoted to the testing of compressors for Westinghouse brakes for electric railway stock, and the other to similar treatment of the very wide range of instruments embodied in the company's railway signalling manufactures—track-circuit-relays, time element relays, cab signals, and so on. Both rooms are adequately provided with the necessary equipment for obtaining the various loadings, voltages, &c., to meet all testing requirements. In the compressor test room there is an E.C.C. motor-generator set with two generators in series for voltages above 800, and another machine of similar make with two generators, one for from 30 to 230 V and the other for from 220 to 800 V. The open-type slate-panel switchboards in this room were designed and made in the works.

Our thanks are due to the Westinghouse Brake & Saxby Signal Co., Ltd., for permission to visit the factory and to take photographs, and to Mr. F. C. Brittain, works manager, and members of his staff, for their assistance in the collection of the above information.



Machines for Compressor Tests



Switchboard in Compressor Test Room

An Inexpensive Electric Furnace

FOR temperatures up to 900 deg. or 1,000 deg. C. an inexpensive electric furnace made by winding nichrome wire upon a grooved alundum core and insulating it with two or three inches of magnesia or asbestos is described in *Science*. Using number 17 (B & S gauge) nichrome wire a furnace core three inches in diameter can be held at 900 deg. C. on about 10 or 12 amperes with three inches of asbestos packing. If wound in parallel with two strands of number 17 (B & S gauge) nichrome wire about 16 or 17 amperes will give the same temperature more rapidly. For temperatures above 950 deg. C. another heating element should be used.

Platinum or one of the platinum metals is selected, since it loses weight at temperatures around 1,500 deg. C. Overload on the heating element may be reduced as follows. An alundum crucible is wound with platinum wire and the whole is embedded in a block of alundum cement. This is then introduced into the nichrome-wound furnace. The mix is placed in a platinum crucible, which in turn is placed in the alundum crucible and covered with an alundum disk. Unless a rather large melt is wanted, a simple carbon resistance furnace is much preferable, as it is faster and requires less careful operation. The furnace described below uses a crucible the size of one's little finger and of any convenient length, made out of an ordinary arc lamp carbon. It has been used on a maximum of 60 amperes a.c. 110 V, and is controlled by two 3-kVA a.c. regulators. For this amperage the temperature reached has been limited to 2,300 deg. C.

The furnace itself operates under vacuum. It consists of a metal jacket cut from a piece of 8-inch steam pipe, threaded at one end, on which a cap has been tightly fitted. The other end was turned in a lathe to make it true, and on a metal plate a groove was turned to fit the open end of the pipe. Into this groove was fitted a rubber gasket, smeared on both sides with stopcock grease. In the top of the plate a two-inch hole gives a view of the interior. Over this hole is fitted a glass funnel with a similar gasket contact. Into the sides of the pipe have been fitted several ¾-inch pipes, two of which serve to introduce the lead wires, one for the offtake to a vacuum pump, and one for a monometer gauge. The crucible —an arc lamp carbon drilled out at one end for the desired depth—is fastened into a collar by means of a set screw. The collar in turn is fastened to one of the leads. Another carbon, solid, similarly fastened into a collar and connected to the other lead, is placed on top of the loaded crucible carbon and is pressed into place by an adjustable spring. The crucible itself then offers the greatest resistance in the circuit, since its cross-section forms the smallest amount of conductor. It is therefore its own heating element.

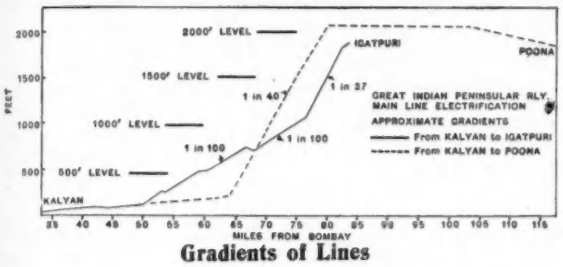
Railway Regenerative Braking

General improvement in operating conditions, even more than saving in energy consumption, has justified the adoption of the system on the Great Indian Peninsula Railway

By J. A. COLAÇO, B.Eng., A.M.I.E.E.

THE electrified main lines of the Great Indian Peninsula Railway include two heavily graded sections in the regions where the railway crosses the Western Ghats. On the Poona line, the mountain section known as Bhore Ghat extends from Palasdhari to Lonavla, a distance of about 15 miles. The average gradient is 1 in 40 with a maximum of 1 in 37; severe curves exist and there are 16 tunnels of varying lengths. The Igatpuri ascent includes about 25 miles of 1 in 100 gradient followed by a short stretch of 1 in 60 and six miles of 1 in 37 to Igatpuri, including 10 tunnels.

Train working on the mountain sections had always presented many difficulties in the days of steam working, so that, when the question of main line electrification was taken up,



Gradients of Lines

full consideration was given to the problem of regenerative braking. The recommendations of Messrs. Merz & McLellan, consulting engineers to the Indian Railway Board, were accepted by the Railway Authorities and the orders for the locomotive equipments were entrusted to the Metropolitan-Vickers Electrical Co., Ltd., which had recently carried out a similar contract in South Africa, and to which the author is indebted for some of the following notes.

Details of the freight electric engines supplied to the G.I.P. Railway have already appeared in an earlier issue of this journal.* The electrical equipment comprises four motors each of 650 h.p., giving a total tractive effort of 56,000 pounds at the hourly rating. Under normal conditions, the motors work as ordinary series-wound machines, but, when it is desired to work in regeneration, the field windings are separately excited by means of two axle-driven generators, one for each truck. Control of the regenerative load is obtained by manual regulation of the field current of the axle generator.

The "axle-generator system" has almost ideal characteristics for this service. In order to ensure safety of the vehicle, it is necessary that the retarding tractive effort should increase rapidly with the speed. By mounting the exciter on the axle, this effect is obtained in a simple and efficient manner. Protection to the motors from sudden fluctuations in the line voltage is afforded by the stabilizer resistance. The axle generator is connected across the main motor fields with the stabilizer resistance in series. The main motor armature current is carried through this resistance, thus giving a differential effect on the main motor fields when the regenerated current suddenly increases, as in the case of a large drop in line voltage. This differential effect is necessary for stable operation of the main motors.

The operation of the system can be best understood by considering an actual example. Assume that the engine is descending a grade and is regenerating a given current. If the grade increases, the engine and train will tend to speed up but as the train speeds up, the axle-generator voltage will increase, which will tend to increase the main field. The increase in speed will, however, increase the regenerated current which, passing through the stabilising resistance, tends to decrease the main field strength. These two tendencies, therefore, oppose each other and, on the changed speed, will reach a new balanced condition.

Excessive loads are taken care of by means of overload relays and protection from excessive regenerated voltage is given by the over-voltage relay. Load sharing between the equipments of each truck is secured by the provision of a balancing resistance in the circuit of the exciter field. The inequality of regenerated current can be brought about on account of unequal diameters of the wheel sets of each truck. It must be borne in mind that the bogies are interchangeable and it happens, not infrequently, that two trucks with widely different mileages are fitted under a common body. In practice the range of the balancing resistance is quite ample to rectify the inequalities to which reference has been made.

The method of bringing the equipment into regenerative working has proved in practice to be simple, efficient, and virtually fool-proof. Its essential features are as follows: The train having been brought to a steady speed under control of the train brakes, the combination lever is thrown into the required combination, *viz.*, series, series-parallel, or parallel; the regenerating lever is adjusted to a suitable notch; and, finally, the accelerating lever is moved to the first, *i.e.*, all-resistance-in position. The state of things now is that the motor fields are excited, while the armatures are still isolated from the line. There is a back e.m.f. generated in the motors which is gradually increased to the line voltage by moving the regenerating lever to the higher notches. When the two voltages are balanced, the motors, which are shortly to act as generators, are ready to be connected to the line. This is effected by means of a push-button which controls the line switches in the main circuit. The armatures are then connected to the line and, provided the generated voltage is somewhat higher than the line voltage, a small regenerated current flows, being governed, of course, by the value of the main resistance. The latter is cut out fairly quickly, and load is transferred to the regenerative brake from the train brakes by gradually releasing the latter. The new method has made the work of the operating staff extremely pleasant and safe, and, naturally enough, when the initial nervousness has worn off, it is appreciated at its true worth.

A Trip down the Thull Ghat

Steam-driven trains heavily loaded with agricultural produce arrive at Igatpuri from Central and Northern India and are received in the marshalling yards there for the usual shunting

Typical Freight Train at Catch Siding

and for axle-box and brake examination. The steam engine is then uncoupled and in its place two freight electric engines are coupled to the train. A full load generally consists of about 60 vehicles with a total weight of 1,600 tons, comprising wagons from various Indian railways.

The leading engine, which is known as the "Ghat" engine, pilots the load only on the mountain section down to Kasara. The rear or the train engine is left coupled on the train at Kasara and it works the load on to the goods classification yard at Kalyan Junction. During the descent of the Ghats in regeneration, the two engines work as separate units, but a code of signals has been arranged by means of which the two drivers can effectively co-operate in working the train. The Ghat driver is, however, in complete charge of the braking

* ELECTRICAL REVIEW, November 22nd and December 6th, 1929.

of the entire train, the train driver leaving his brakes alone except in case of emergency.

Before the start, the Ghat driver examines the condition of the train brakes to satisfy himself that they are in good condition. The two drivers then confer and decide upon the correct regenerating notch in which to work over the various sections of the grade. All is now ready for the train to start, and, when the signals are clear, the driver notches up the controller in the motoring combination. Following a short level stretch, there is a slight dip over which power is shut off and the brakes are applied in order to bring the train to a stand at No. 1 Catch Siding cabin.

There is a stop of about one minute at this catch siding in order to enable the cabin-man to satisfy himself that the

Map of Electrified Lines

train brakes will bring the train to a stop and to hold it on the grade. The signals to proceed being given, the Ghat driver gradually releases the brakes in order to set the train in motion. As the train gathers speed, the train brakes are partially reapplied so as to keep it under control all the time. When the desired speed is obtained (and this may vary from 12 to 15 m.p.h.) and is steadily maintained, the Ghat driver, who has already put his combination lever in the right position, operates the accelerating and the regenerating levers to equalise the generated voltage to the line voltage. When this is done, he depresses the regenerating push-button and brings in the line switches, thereby connecting the motors to the line and then cuts out the main resistance. At the same time, he blows his whistle once to indicate the fact to the train driver on the rear engine. The latter, who is fully prepared in other respects, operates his push-button and connects the second engine to the line, at the same time blowing his whistle twice. These operations occupy less time than it takes to describe them.

It is clear that owing to the balancing of line and engine voltages, there is but a small regenerated current, most of the braking being still done by the mechanical brakes. On receiving the signal from the train driver, the Ghat driver gradually releases the brakes, when the load transfers itself automatically from the train brakes to the regenerative brake. The two drivers then move the regenerative notching lever so as to adjust the load to the desired speed. This last operation is in practice simpler than one would imagine, as the drivers, who have had long experience in the handling of steam-operated goods trains, have quickly acquired the necessary skill in deciding on the right notch in which to work trains of varying weights.

Once the load and the speed have been correctly adjusted, the driver has nothing to do but to sit back and keep an eye on the meters in the cab. The regenerative brake holds the train steadily at the adjusted speed until the approach of No. 2 catch siding cabin makes it necessary to slacken speed. This is done by the Ghat driver gradually applying the train brakes when the regenerative load steadily falls away, being transferred to the mechanical brakes. When the load falls to nearly zero, the regenerative brake is switched off on both engines and the train is brought to a stand on the train and engine brakes. After making a stop of the required duration at the cabin, the drivers start up again as before and work the train to the bottom of the grade.

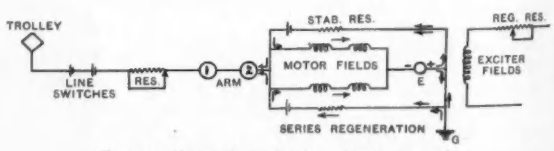
A point of special interest was to determine the effect of sudden tripping of the entire regenerative load due to the power going off the line, to over-load, or to over-voltage. In order to impart confidence to the drivers, arrangements were made during the advanced part of their training to trip the control circuits manually when the engines were fully loaded in regeneration. In an actual example, with a 1,500-ton trailing load and two engines regenerating at 13 miles per hour, the circuits were manually tripped out simultaneously on both engines, without previous warning to the drivers. There was a jerk on the train as the load dropped to zero, but the drivers instantly guessed the trouble and made an emergency brake application. The speed increased momentarily due to spring in the couplings and loss of braking power, but was quickly brought down to normal and the train was stopped in the usual way. There was no damage to couplings or drawbars on the train.

On arrival at the foot of the Thull Ghat at Kasara, the leading engine is uncoupled and is retained in the yard to assist the next train proceeding up the Ghats. The train engine works the train onward over the portion known as the "foot-hills," which includes nearly 25 miles of an average gradient of 1 in 100 down to Vasind. Having worked the train as far as the incline in the motoring combination, the driver changes into the parallel regenerating combination. The load is adjusted to the speed (which is nearly the maximum of 35 m.p.h.) and the train proceeds at a remarkably steady speed, notwithstanding appreciable changes in grade. When an "up" grade is encountered, the engine automatically changes into motoring, but again returns to the regenerating combination when a down grade is reached. During all this time the driver has no need to alter the setting of his combination and regenerative levers. With steam working considerable skill was necessary to prevent surges in long trains passing over varying grades. Beyond Vasind the country is flat with a fall of only 75 feet down to Kalyan in a distance of 17 miles. The train is, therefore, worked in the motoring combination to the classification yards at Kalyan Junction, where it arrives with its brakes very little the worse after a descent of 1,896 feet

Results of Working

While substantial savings of energy are being obtained as a result of regenerative working, it is in the general improvement of the operating conditions of Ghat working that the main justification of the system lies. In the steam days, the descent of both the Ghat sections, but more particularly of the Thull Ghat, was fraught with many dangers. Hence, a large staff had to be maintained at the summit of the Ghat at Igatpuri and at Lonavla in order to make what was known as the "Ghat adjustment" of the brakes. The confidence engendered by regeneration is such as to induce the railway authorities to experiment with the ordinary "main-line" brake adjustment for descending trains. Considerable economy in time and in wages has resulted from these arrangements.

It will be quite clear that, with the regenerative brake holding the train during its descent, the mechanical brakes are always in sound condition to give rapid braking action in case of emergency. Hence, higher speeds can be adopted, as well as heavier trains, both factors conducive towards economical working. As regards the brake gear itself, it was not an



Connections for Series Regeneration

unusual occurrence under the old conditions, for trains to arrive at the foot of the Ghat with hardly any brake shoes left on them. One can easily realise the wear and tear on the wheel tires which consequently required replacement much more frequently. As a result of regenerative braking, brake shoe replacements in the Ghat sections are falling to negligible proportions and the wear and overheating of tires has been greatly minimised.

Another interesting point which has arisen from the adoption of regenerative braking is whether so many catch sidings are necessary. These are a source of delay, although a necessary one under the old conditions. But under the new, it is being felt that a reduction in their number could be made without introducing an element of risk in the working of the trains. Incidentally, their partial elimination would automatically improve the results of regenerative working because of the saving of energy which would otherwise be dissipated in the brakes while bringing trains to a stop several times in the descent of the short Ghat sections.

Notes on an Electric House

The results of the second year's operation of an electric house are found to compare well with those of the first year when some coal fires were used for room heating; the housewife's point of view is also given as being perhaps more valuable than that of an electrical engineer

By E. H. W. BANNER M.Sc., A.M.I.E.E., A.Inst.P.

AN account has been given previously* of the general results and costs of running for the first year of the author's electric house. A second year's figures are available and together with notes of experience gained and recommendations form the basis of this further article.

It may be stated at the outset that the installation is entirely satisfactory, and that in the writer's opinion electric houses are far beyond the experimental stage and not only suitable for an electrical engineer or a man of unlimited wealth. It is not only convenient and clean to run an electric house, but it is also economic.

The connected load is now greater than during the first year so that the comparison of costs alone is not sufficient; the various items of the installation are detailed for comparison.

It would be incorrect to call the house all-electric, as there is still a small coal bill and a very small gas bill. As the house was new when entered and the kitchen fire-heated boiler in sound condition, it was decided to continue its use to save the initial cost of a new electric water-heating installation—a considerable item. For the same reason a gas wash-boiler was retained, but this is the only use for gas. Coal fires for water heating are usual twice a week. It has now been decided to install a Ferranti water-heater to take over all the present coal load. The electric water-heater is to be installed in series with the existing coal-fired boiler, so that the latter will be available for use if necessary and the same delivery pipes and taps will serve. Unfortunately no special water-heating rate is available, but from current figures the cost per kWh should be something less than 0.75d.

Costs of Working

Comparative figures for the first and second year's working are given in the table below; these need a little explanation. First, at the end of the first quarter of the second year the method of assessing the fixed charge was altered to a simpler method and at the same time was reduced from £1 7s. 3d. per quarter to £1 4s. 4d., a figure which now holds. Secondly, on the consumption side more use is made of self-contained electric boilers of two pints capacity—one as a consequence of last year's E.T.B.I. competition—and whereas in the winter of the first year some coal fires were used for room heating this method has now been discarded and coal is used only for water heating. The comparison of costs shows a slight reduction in the weekly average for all services—lighting, heating, and cooking. At the same time the increased proportion of the electric costs is reflected in the lower cost per unit, now 0.76d. against 0.875d. for the first year. The occupants are two in number as last year.

TABLE OF COMPARATIVE COSTS.

	First year.	Second year
kWh consumed	3,499	4,626
Cost at 0.5d. per kWh	£7 5 10	£9 12 9
Fixed charge	5 9 0	5 0 3
Cost of electricity	12 14 10	14 13 0
Average kWh per week	67	89
Average electricity cost per week	0 4 10½	0 5 7½
Coal, cwt.	32	11
Coal, cost	3 0 1	1 0 11
Gas, therms	18.3	10.8
Gas, cost	0 14 6	0 8 11
Total cost	16 9 5	16 2 10
Average cost per week	0 6 3½	0 6 2½
Average price per kWh	0.875d.	0.76d.
Ratio of electricity to total cost	78%	91%

The accompanying curve makes it possible to find the cost per kWh and total cost for various annual consumptions and is based on the charges stated above.

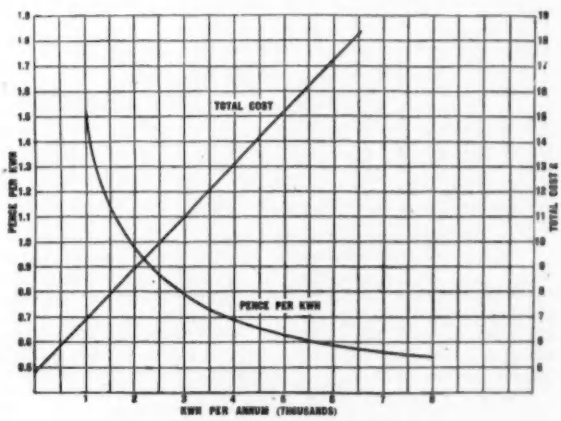
Heating and Cooking

Some alterations in the connected load include a Ferranti two-bar fire, rated at 2.4 kW instead of the original 1.2 kW. This fire has to be met in action to be appreciated fully. Its chief merit lies in its pronounced radiation. Whilst a given kilowatt loading will raise the temperature of the air in a room by a given amount in a certain time, this rise of temperature is independent of the radiant heat which is, however, felt by anyone in the path of its rays. Because of this, a lower air temperature feels comfortable, resulting in an economy of energy. To obtain the best effect from this it is desirable that the fire should be in a room where it can radiate directly to most of the floor area and not where a table in the centre of the room obscures the radiation from a large part of the room and itself becomes scorched.

The "Baby Belling" cooker, although regarded dubiously by friends who were only used to the usual large gas cooker, has proved itself sufficiently large for all requirements. Later in the article further notes on this and other purely domestic aspects will be found. To obtain the best results from the cooker and separate boiling plate special flat-bottomed aluminium utensils are used.

Experience with Plugs

A difficulty has been discovered which could well be dealt with by some standardising authority; the connectors for each of the self-contained units should all be interchangeable. Initially, all the gear was of G.E.C. make and all connectors were common; that is, it was not necessary to find a particular connector for the kettle, iron, toaster, &c. Later a quart milk boiler of another make was added, when it was disappointing to find that the connector supplied would only fit this article, and *vice versa*. On acquiring the second small boiler previously mentioned, it was still more annoying to find that again a different connector was used, none of the three being interchangeable. The main plugs and sockets are Reyrolle throughout, and these are eminently satisfactory besides having the valuable earth shield to the live pins. All fires are fitted with 15-ampere plugs and other appliances with 5-ampere plugs, the wiring being suited to the loading by running each 15-ampere outlet direct from the distribution board and grouping the others. This system prevents a fire from being plugged in to a small-current circuit and has proved satisfactory in practice.



Cost in Relation to Consumption

Reyrolle's method of flexless connectors by having a plug as part of the appliance and the socket mounted at the correct height for entry appears to be sound where the surface is sufficiently true to allow of correct alignment. The extension of this to a table or dinner wagon having a single flexible connection and a row of table sockets for table cooking, illustrated recently in an electrical paper as a futurist idea, is not so far from present tendencies as might appear at first sight.

The plugs referred to enable earthing to be carried out. This is not possible with all kinds, owing to the two-pin connector at the other end having no means of earthing. As the small milk boilers have frequently given mild shocks on account of poor insulation the writer has fitted them with an earth connection by means of the metal band around the plug, or by means of a screw scraping the metal case of the boiler. The provision of an earth connection seems very desirable. Its presence does not necessarily affect the "earth or insulate" controversy, as the question of its use is still left to the user (or contractor).

* ELECTRICAL REVIEW, March 14th, 1930.

The installation has been changed to a.c. during the year.

Too much cannot be said about the employment of only good registered electrical contractors and competent wiremen, but even then some discrimination is needed. A contractor will often instal a fire at a consumer's request when he knows that the bills, at the ordinary lighting tariff, will be prohibitive. Although such a contractor or dealer may consider it bad policy not to sell an electric fire when he can, he will undoubtedly lose in future sales, as a dissatisfied consumer will generally be the means of preventing other prospective consumers from obtaining electrical appliances.

Anyone giving contracts to "Plumbers, Gasfitters and Electrical Engineers," as some one-man concerns are designated, is generally asking for trouble, unless such a man has been employed on responsible wiring by a larger firm and is himself a registered contractor—an unlikely event.

Mrs. Banner gives the Housewife's Point of View

Housewives are usually rather conservative regarding untried ideas and much prefer the old order of things to the new. This conservatism is very marked towards electricity in the home. If its adoption is suggested one gets the reply, "Oh no, I simply dare not use it, I should be terrified of getting shocks," &c.

The advantages of the electric sweeper and iron are generally appreciated, but in many instances the iron is the only electrical apparatus installed. What energy is wasted walking backward and forward to replace the old type of flat iron on the fire or on the gas ring, and in having to clean it well before use! This procedure makes it impossible to do much ironing in a short space of time owing to the iron cooling so rapidly. An electric iron on the other hand is simply plugged into the socket and one does not have to move until the clothes are finished.

Fires and cookers, including toasters, milk boilers, kettle, &c., would appeal just as much to the housewife if tried. Personally, I have no wish to go back to the old-fashioned methods, especially with regard to fires. The electric fire is so convenient and economic, as our bills show, especially the radiant type which quickly warms a room. There are no fumes as in the case of gas, and no dust and ashes to blacken ceilings, walls, and furniture as with coal fires. When pointing out the advantages of these I am always met with the argument that coal fires are so much cheerier-looking than electric ones. This may be the case, but how much better it would be for everybody if the air were free from smuts and the sunshine did not come through a smoke haze, as in large towns and suburbs, which would be the case if only coal fires could be abolished.

I have cooked by gas and electricity and would not exchange my little electric cooker for the very finest and most up-to-date gas oven. The food retains its flavour and little weight is lost, as there are no fumes to dry up the food. As gathered from the name my cooker is quite small, but I found cooking for six was not a great task for it, especially as I have two quart boilers, which can be used for heating soup, &c., in addition. The two boilers are used for coffee and milk at breakfast in place of a coffee percolator, and also for boiling eggs. There is a separate boiling plate which is used for boiling or frying; it is more economical than the cooker when the latter cannot be used to its full capacity. Self-contained units are, generally speaking, much better for small things than the cooker.

In addition I have an electric kettle supplied from a socket at the side of the bed which is a great boon for making morning tea. A toaster is another useful article which makes it possible to toast actually at the breakfast table. Another great asset is a warming plate for retaining the heat in cooked food.

To summarise it will be seen that I am very pleased with my electric house, and hope it will never be necessary to return to a house without the conveniences of electricity.

I am very pleased I have overcome my prejudice against an electric house, as I was not at all keen on the idea at first. I am sure if other housewives would "do it electrically" they would never regret it, always provided that the tariffs were satisfactory.

Book Reviews

Applied Mathematics for Engineers. Vol. III. By T. HODGSON. Pp. viii+320; figs. 126. London: Chapman and Hall, Ltd. Price 13s. 6d.

In the previous volumes of this series Mr. Hodgson has dealt with graphical statics, and the rudiments of the calculus, illustrated with reference to problems in dynamics. The present volume is devoted to the more elementary forms of differential equations. In the preface to the work the author states that a working knowledge of the differential and integral calculus is assumed. This standard need not be a high one, for the first portion of the book, dealing with differential equations in which the variables are separable, contains matter usually found in text-books on the calculus for engineers. The elementary treatment of exact equations is illustrated by simple problems in thermodynamics. Linear differential equations with constant coefficients are treated in the usual way, and the work is illustrated by problems in alternating-current theory and in the theory of struts. The chapter on partial differential equations is, as would be expected in a work of this character, planned on quite rudimentary lines, but it will, nevertheless, be found very useful by the student. Included in the book are chapters on Fourier's theorem and harmonic analysis, on double and triple integration, on spherical trigonometry, and on the treatment of alternating-current problems by vector methods. We have indicated in some detail the contents of this book as, although purporting to be a work on differential equations, quite a considerable amount of space is devoted to matters usually considered without the scope of the title, and which are included in ordinary books on the calculus for engineering students.

The method of treatment adopted by the author is that usually found in books of this character. The worked examples illustrate very clearly the principles expounded, and the student who conscientiously attacks a fair selection of the numerous problems set for solution will acquire a sound working knowledge of the manipulation of the simpler differential equations encountered in engineering theory. Although a small point, we think that most students would prefer that the answers to the problems were given in an appendix, at the end of the book, instead of the present arrangement of each problem being followed by its answer.

The author has not maintained his average standard of clarity in the chapter dealing with the vector method of treating alternating-current problems, where he draws a distinction between an imaginary unit "i," which is identified with the square root of minus one, and what is designated a Steinmetz operator denoted by "j." These two quantities are contrasted as being, respectively, imaginary and real. As, however, it appears from the reasoning that the two quantities can be used indifferently in analysis, it seems rather regrettable that there should be a tendency to confuse the mind of the student of an elementary work, such as this, by drawing a distinction between two quantities which, for practical purposes at any rate, are the same.

The index to the book does not seem to have been very well compiled. While we find indexed a name of which merely passing mention is made in the text, there are no references in the index to vectors, imaginary quantities, or to the "j" operator.

"Hutte," des Ingenieurs Taschenbuch. Vol. I. 26th edition. Pp. 1,199; 980 figs. Berlin: W. Ernst & Sohn. Price: cloth Rm.17,5, leather Rm.20,5.

"Hutte" has merited and gained renown throughout the scientific world, and the volume under review will in nowise diminish its fame. The complete work is in four volumes and the first of these deals with the fundamental principles of technics. It contains eight principal sections, mathematics, mechanics, technical physics, heat, elasticity, properties of matter, measurements, geodesy and practical geometry, with an appendix on currencies, weights and measures, alphabets and the patent laws of different countries.

There would be little, if any, exaggeration in stating that the volume gives the essence of an honours course in natural science of a high-grade university, supported by tables and data of the highest precision.

The mathematical section covers the whole range of practical mathematics and includes excellent summaries on differential equations, vector analysis determinants, Fourier series and nomography.

Mechanics are treated in an equally complete manner, the range including mechanics of rigid bodies, mechanisms, simularity, fluids and gases.

Technical physics include oscillations, acoustics, protection against vibration and transmission of sound, and optics.

The heat section deals with thermal properties of substances, heat transmission, thermodynamics, perfect gases, steam and combustion.

The remaining sections are equally well balanced and complete. A full list of the contributors to the volume is included and from this may be cited the names of Föppel (mechanics) and Mollier (heat).

The book is well bound and clearly printed. It will be a mine of information to all serious readers, and a source of real pleasure to those of imagination who are able to see beyond the framework to the men who have been responsible for its production.

The E.A.W. at Glasgow

What women have done in Sweden, France, and Denmark

THE programme of the Second International Conference of the Electrical Association for Women, which was opened in Glasgow last Wednesday, includes—in addition to the opening address by Lady Moir, O.B.E.—three papers by foreign delegates on the use of electricity in the home.

Lady Moir looks beyond the question of the undoubted convenience and comfort derived from electricity, and asks whether it pays to use it. She points out that the value of electrical knowledge among women will be very great, and refers to the fact that the Board of Education has appreciated the need of instructing teachers at Domestic Science Centres in the applications of electricity, the first school on the subject (organised by Miss C. Haslett, C.B.E., director of the Association) having been held last year. A second course on similar lines is to be held at the beginning of next August. It is hoped that the Scottish educational authorities also will include elementary training in their curricula, thus supporting the individual efforts of Miss R. F. Kennedy and other members of the Glasgow branch.

The Lady Belhaven and Stenton
President, Glasgow Branch, E.A.W.

As a result of the work of the Association, several Polytechnics in London now give training in electrical housecraft, which is suitable for girls who wish to become demonstrators and saleswomen. The Association hopes in the near future to award a diploma which will both improve the status of the demonstrator and also give the employer some guarantee of efficiency. The Association has had recently a number of requests for cooks and housemaids who can use electrical appliances intelligently.

W. Ralston] *[Glasgow*

Miss R. F. Kennedy
Hon. Secretary, Glasgow Branch, E.A.W.

Some Developments in Sweden

Mdme. Silfverhielm tells how the National Housewives' Association of Sweden (which she represents at the Conference) has investigated the cost of cooking by electricity, gas, and wood, has held exhibitions of electrified kitchens in Stockholm, has shown propaganda films, and has published a periodical containing articles on home electrification. Nevertheless, the electrification of kitchens has not progressed so rapidly as was generally expected. The main obstacle has been the high price of electricity, but the growing use of two-part tariffs with a low consumption rate has radically changed the situation.

Kitchen electrification has proceeded more slowly in the country, where fuel is cheap, and the greatest use for electricity is for lighting the farmhouse and its outbuildings; the latter development is due to the difficulty of obtaining paraffin during the war, and has proved a big step towards removing the dullness of the country side.

The use of electricity in the kitchen varies considerably in different parts of Sweden. In the mining towns of the extreme north, where fuel is scarce, the majority of the inhabitants cook and heat their homes by electricity, and the consumption per head is 2,000 kWh per annum.

It is estimated that at least 8 per cent. of the farms have electricity available, but most of the heating there is still done by wood, which can be had for the cutting. The poorer classes in rural areas are more likely to adopt electric cooking, since they have to buy their wood. Nevertheless electricity is often used for all purposes on the large estates for hygienic reasons. In the bigger towns gas is very cheap, but the electric kitchenette is becoming popular in the suburbs.

For a sound development of electric cooking, the three points of primary importance are: (1) the electricity rates; (2) quality and price of equipment; and (3) the education of housewives.

Nowadays most of the distributors show great interest in the domestic load. They are replacing d.c. by a.c., the flexibility of which makes it easier for them to cope with the large increase in load caused by intensified household electrification.

The commonest form of domestic tariff includes an annual fixed charge of about 10s. per room and an energy charge of about 1d. per kWh. Recently the American block tariff has been tried; this is based upon the full lighting charge for a certain number of kWh per room per annum, the excess consumption being charged for at a lower rate. Another method of charging, known as the "subtractive tariff," combines the demand tariff and the room tariff. A special meter makes a separate count of all kWh taken in excess of a certain demand. For instance, if the meter be adjusted for a subtraction limit of 0.5 kW, up to this load all kWh are counted on one tally and paid for at a very low rate (*e.g.*, 0.5d.), but an annual charge of £5 per kW is paid for the subtractive limit demand. As soon as the load rises above that value, another tally on the meter comes into action to register only those kWh corresponding to the excess load.

Mdme. Silfverhielm

In one of the two forms of this tariff there is no annual room charge and the excess kWh are paid for at the ordinary lighting rate. In the other, the ordinary annual room charge is paid and the room tariff energy price is applied to the excess kWh. The subtractive meter will automatically utilise the cheap base energy for water heating, &c., and will also disconnect the water heater or accumulator stove when the subtraction limit is exceeded. Due to research work at the Electrothermal Institute at Stockholm good apparatus has now been developed. The Swedish housewife often prefers to proceed step-by-step, and there are types of kitchen equipment available of which the hot-plate, oven, and stand may be bought separately and afterwards combined into a stove.

The Swedish cooking cabinet is really an electric oven with a much lower consumption (300-400 W) than the baking oven, and intended for temperatures from 100-300 deg. F. A regulator, operating upon the bimetal principle, periodically disconnects the heating elements so as to keep the temperature at a pre-determined value, adjustable between the above-mentioned limits.

With the regulator at 100-150 deg. F., the hot-box can be used for warming plates, &c. When set a little above the boiling point, the box can be used for preserving; the jars with vegetables, fruits, and so on, are provided with glass covers and rubber rings, pressed tight by electric clamps. They are then simply put into the hot-box, the current is switched on, and the jars are left to themselves for two or three hours.

Perhaps the most important use of the hot-box is for preparing dishes which need a long heat treatment. After the food has been heated on the hot-plate it is put into the hot-box and kept at the proper temperature automatically. Since the box is well insulated against heat loss, the energy consumption when keeping the food hot in the box is much less

than if it were left on the hot-plate. The electric hot-box is often used, even in gas range kitchens, as its heat can be very accurately regulated, and it causes no fire hazard.

The Electrothermal Institute has developed a type of water heater that is free from some of the disadvantages of existing patterns, in some of which the entering cold water mixes with and cools the contents of the tank. The new water heater has an external heating element in a chamber where the entering water is heated to the correct temperature before entering the tank. The thermal insulation is good enough to keep the water hot for a couple of days. This heater is not yet on the market.

The electrical education of housewives has only just begun in Sweden. Electric kitchens grow in stages; these show precisely where good education work has been done, and often are the results of the work of some enthusiastic and well-informed individual. National work, however, has begun, and is promoted by an association, the "Fera," rather analogous to "Eda."

Electrical Education in France

Mdlle. Paulette Bernège, president of the League for Scientific Management of the Home, gives particulars of the propaganda work of the Société "Apel," an organisation financed by the following distributing companies: Cie. Parisienne de Distribution d'Electricité, Nord-Lumière, Ouest Lumière, and Nord-Est Parisien. The primary object of the Société "Apel" is the examination of apparatus (especially domestic apparatus) which, if technically sound, is provided with a seal guaranteeing its quality. The Society also participates in shows for domestic installations and issues publications. There is another body (the S.P.E.) which engages in research and propaganda regarding lighting. For the education of youth the Society has devised various ingenious games. An electrical lotto is very popular; it teaches children how to know 67 pieces of electrical apparatus in common use; the game has been distributed to all schools in the Parisian zone. A cutting out game, when ended, provides the children with a money box in the form of an electric kettle. For school prizes there is a series of 12 pictures representing children using electrical apparatus.

Mdlle. P. Bernege

Cooking classes have been organised for the pupils of girls' high schools; during the year 1930-31, 97 scholastic establishments had 194 classes.

One company maintains a special member of its staff for visiting schools regularly, where he teaches the elementary ideas of electricity, demonstrates apparatus, and shows kinema films.

Education of the general public is given by varied methods, of which the principal are showrooms, demonstration cars, and taking part in markets and fairs. Again, films and broadcasting naturally play an important part also.

Cooking classes (not free) are given by one company to women in its area. About 110 classes are held every year, the average attendance at which is about 33 pupils. There is also a course on laundry work and ironing.

About a year ago an electrical calendar was issued free to all installation firms in Paris for exhibition in their windows. This indicates for each month the apparatus on which publicity work should be concentrated: January, electric heating; February, the electric iron; March, the coffee percolator; April, the bath water heater; May, the kitchen range; June, the electric fan; July, the hair dryer, the curling iron, and vibro-massage apparatus; August, the electric refrigerator; September, vacuum cleaner; October, the bowl fire; November, electric lighting; and December, small presents.

It is certain that there is much more chance of getting at the public by propaganda if this is carried out on a large scale by seasonal campaigns.

The present development of domestic load in Paris is indicated by the following figures: 1,300 ovens, 870 reheaters, 160 large cooking ranges; 20 concerns entirely equipped with electrical apparatus, of which seven contain more than 30 ranges; several installations in course of erection, one of which includes 250 cooking ranges, and 10 restaurant kitchen equipments; and six dining-room installations. In the suburbs there are 644 ovens, 1,610 reheaters, and four dining-room installations. The five principal distributing companies have nearly 6,000 water-heaters connected. Since 1927 nearly 62,000 small domestic appliances were sold in Paris, 719 refrigerators, and 5,721 bowl fires. In France there are 1,806 power stations with an aggregate capacity of 6,100,000 kW. Ten departments are entirely electrified, 34 to the extent of 71 to 95 per cent., and only two in which the degree of electrification is less than 15 per cent. In four years the whole of the 38,000 communes will be supplied with electricity.

The question of tariffs is closely connected with the development of the consumption of electricity. The Compagnie Parisienne has normal and reduced tariffs, of which the most important are:—

(*a*) Normal tariffs (in francs): low-voltage lighting, per kWh, 1.76; high-voltage lighting, 1.02; low-voltage for other purposes, 1.03; high-voltage for other purposes, 0.72.

(*b*) Reduced tariffs.

Lighting and domestic tariffs.—When the consumption does not exceed a certain figure the ordinary tariff of 1.76 fr. is charged. For a consumption above this the tariff is 1.03 fr.; and for a still higher consumption, the tariff is reduced to 0.37 fr.

The night tariff (applied to uses other than lighting) is in effect equally applicable to other hours of the day (for instance, between 11 a.m. and 1.30 p.m.), which enables cooking to be done for luncheon at the very low rate of 0.31 fr. per kWh.

The meters of the Compagnie Parisienne which are arranged for these tariffs have three series of counters, one recording during the hours of "night tariff," the other for the day tariff, and the third for the tariff covering the hours of peak load.

In France women do not take the same part in the education of the public that they do in Great Britain and in the U.S.A.

Electricity in Denmark

Madame Karen Braae, M.B., is vice-president of the Town Council of Copenhagen and chairman of the Copenhagen Housewives' Association. In her paper she says that 92 per cent. of the population of Copenhagen uses electricity for lighting, but the tariffs in force in the towns (2d. to 6d. per kWh) are not favourable to its use for other purposes. In the first place fuel (coal and oil) has to be imported; secondly, both the electricity and gas undertakings are municipally owned and there is a tendency to favour the latter and to use the revenues from the electricity undertaking to relieve taxation. The municipality of Frederiksburg is exceptional in charging 1d. per kWh used off the peak. In the country districts, which are generally served by companies, electricity is used to a considerable extent in kitchens and in laundries; thus, the rural population is in advance of that living in towns.

Mdme. Karen Braae, M.B.

In spite of the high rates electricity is very largely used in the towns for vacuum cleaners, toasters, tea and coffee making, boiling saucepans, &c. An agitation is being conducted for a two-part tariff, but at the same time research work is being undertaken to throw light upon the value of various household electro-thermic devices, particularly with regard to their effectiveness in relation to gas, coal, coke, and oil. The conclusion has been reached that the correct use of appliances has the same economic importance as the price of electricity. It is essential to recognise three things: (1) the greater efficiency of the low-wattage boiling plate for general purposes; (2) the necessity for the hot-plate and pot (which should have a plane surface) to be of approximately the same size; and (3) forethought to enable the residual heat of the hot-plate to be fully utilised.

New Use for Invisible Rays

The "Radiovisor" system of remote control is shortly to be used at the Dorchester Hotel in London. The hotel garage is in the basement, and owing to the difficult contours of the ground it is approached by a steep and bending road only wide enough for one car. Some means has to be used to prevent one car coming out of the garage as another starts to descend the slope to enter, and in order to eliminate the human element invisible light rays are to be used.

An Electrified Farm

The Greater Felcourt all-electric farm, where most encouraging results have followed the application of electricity to agricultural, horticultural and general farming operations, has been completely re-equipped and modernised with new appliances

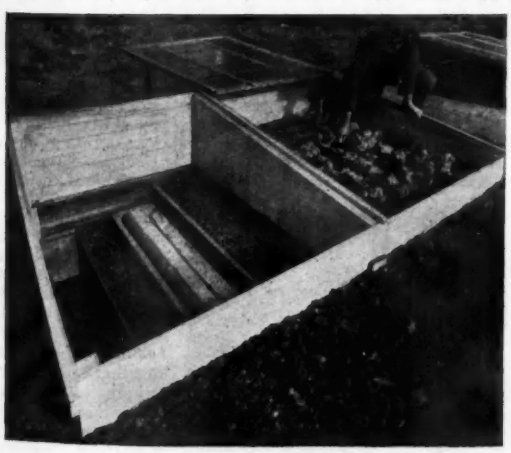
AGRICULTURE, one of the oldest and certainly one of the most important industries, is one of the last to avail itself of the benefits and convenience of electricity—not so much on account of lack of enterprise, as because rural areas have had to wait for cheap electricity. Appreciating that the facilities now available in many parts of the country are, however, already providing exceptional oppor-

Portable Threshing Machine Motor

tunities for farmers to aid themselves, Mr. R. Borlase Matthews has completely re-equipped his well-known farm with modern appliances of numerous types in order to demonstrate just what electricity can do for the farming community.

During the past ten years valuable investigation has been proceeding at Greater Felcourt, near East Grinstead, in Sussex. The farm is run all-electrically, and is divided into two sections, *i.e.*, the main farm buildings in and around which commercial applications of electricity, such as lighting and motors, are used, and the experimental section, wherein experiments on new applications are tried out.

The electrical equipment of the farm has recently been brought entirely up-to-date by means of apparatus supplied



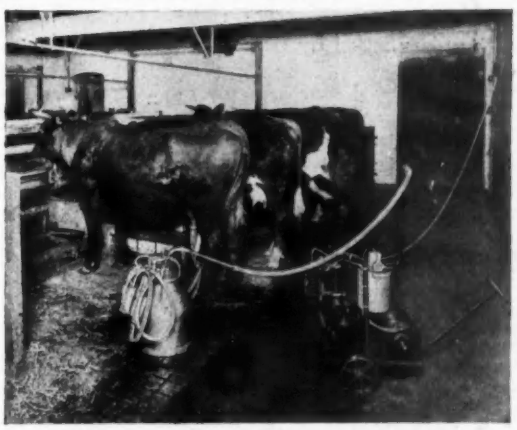
Method of Soil Heating

by the General Electric Co., Ltd. Efficient yard lighting is a source of great convenience on a farm, and in this instance dispersive reflectors and "Pearl Osram" lamps have been installed, controlled by push buttons and an automatic three-minute time switch. The dairy is entirely separate from the milking shed, and it is illuminated, with careful observance of hygienic principles, by totally-enclosed dust-proof fittings. Another feature of the dairy is the thermal storage water heater, by means of which an ample supply of hot water is available for cleaning utensils. Both the cream separator and the butter churn are operated by a motor.

The wiring throughout the whole of the farm is carried out on the c.t.s. system and "Magnet" moulded insulating accessories, such as switches, ceiling roses, and lampholders are used exclusively. The result is an installation which is low in first cost, easily installed, eminently safe, and warranted

to withstand the action of damp and deleterious uric acid and ammonia fumes. The cowshed is an example of modern lighting without shadow at the most important point of all, *viz.*, milking level. The lighting fittings consist of enamelled steel dispersive reflectors equipped with sixty-watt "Pearl" lamps, similar to those which have been standardised throughout the farm. This has led to simplification in installation, and facilitated the stocking and replacement of lamps. Two-way switching is adopted in places where it adds to convenience of control.

Pendant type plugs and sockets are used for connecting portable appliances, such as groomers, clippers, &c., and by this arrangement the obstruction of alleyways by flexible connections and interference with other operations is avoided. An Alfa-Laval electro-magnetic milking machine is installed. The necessary vacuum is obtained from a pump situated in an adjoining room, driven by a 2¼-h.p. agricultural motor unit



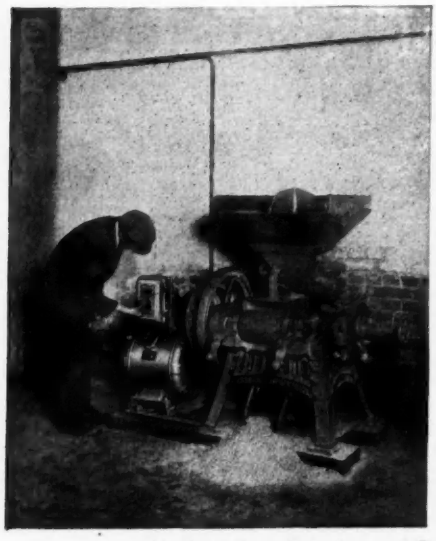
Portable Alfa-Laval Milking Machine

with a starter mounted on the motor body. The portable milking machine which is used in this section of the farm should appeal particularly to small tenant farmers; there is no piping or other installation work, the machine being entirely self-contained.

Low-speed motor units comprise a 3-h.p. motor, with back-gearing to produce a speed of 470 r.p.m. at the pulley, and a starter which is push-button operated and mounted on the motor body, the compact and self-contained nature of the equipment making it readily transportable, serving to drive either a grinding mill or a root cleaner and pulper, as required. Similar agricultural units of various types are to be seen in different parts of the farm.

The portable vacuum cleaner employed on the farm greatly

Application of Suction Groomer



Push-button Grinder and Intensive Greenhouse Lighting

facilitates the grooming of cattle and horses, it draws all dust and dirt from their coats into the dust bag without polluting the atmosphere. Attachments are provided so that the groomer can be converted into a portable cleaner for cleaning buildings, machinery, &c., and also for cleaning out incubators after hatching. With a further attachment, this appliance can be used for blowing dust out of machinery, including motors.

A direct-coupled grinder, kibbler, and crusher represents the latest practice in self-contained electrically-operated food preparing machinery, and is controlled by a simple push-button starter; its transmission losses are low and it occupies very little floor space. G.E.C. portable agricultural motors are used for driving other machinery and one machine of novel design, the "Drumotor," should find favour on account of its extremely simple and robust design and its ease of handling when being transported; gearing is entirely eliminated.

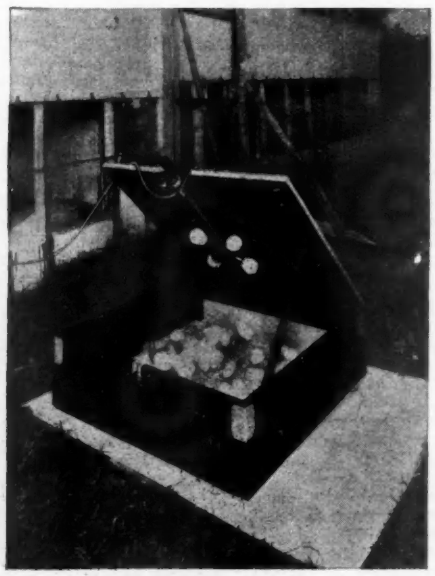
Example of Farm Lighting and Novel Portable "Drumotor"

A 15-h.p. portable motor on a truck is used for threshing. An electrically-driven pump is used for raising water to the storage tanks and another for raising liquid manure from a central sump for distribution on the land. Another useful piece of apparatus is a grindstone; the motor drive saves labour and leaves both hands free for the work engaged upon.

In the experimental section of the farm is a workshop equipped with a number of lathes and other machinery, all driven electrically, and a 10-kW generator, which supplies the power used on the farm, is driven by a Petter oil engine. Outside the workshop tackle is set out to demonstrate the round-about method of electric ploughing, and electric cables for heating the soil and providing bottom heat in garden frames are utilised with conspicuous success. In the greenhouse are tubular air heaters with automatic temperature control by means of a thermostat. Intensive lighting for promoting and controlling plant growth is carried out by means of large reflectors equipped with high-power gas-filled lamps. Experiments have shown that the formation of rust and fungoid growth on plants can be checked by keeping the air in motion by electric fans, and a thermal storage heater is also fitted for supplying hot water.

In addition to the main farm buildings and the experimental section, there is a large poultry farm on which electricity is used principally for lighting the poultry houses and for incubating and brooding, while provision is also made whereby it is available for such purposes as egg testing and ultra-violet ray treatment for chicks. There is an elaborate dimming device for operating the lamps installed in the laying houses, and by automatic control the light is increased gradually when switching on and dimmed gradually at the end of the lighting period. The poultry houses are equipped throughout with c.t.s. wiring and moulded insulating switches, ceiling roses, and lampholders. The lighting units are dispersive reflectors fitted with sixty-watt "Pearl" lamps; they produce correctly distributed illumination of high intensity over the feeding area. Detachable ceiling roses are used, permitting the complete pendants to be removed for cleaning. For ensuring that an adequate supply of drinking water is available during frosty weather poultry-drinker warming plates are used. Radiant electric hovers are used for brooding, which are found to be economical in use, and extremely simple and efficient.

The G.E.C. electrical equipment on this farm and the services of the company's Agricultural Department have thus been made available for inspection and demonstration.



Poultry House Illumination and Radiant Heat Hover

New Wholesale Showrooms

The Sun Electrical Company's Extensions

MANY hard things are said about the "middle-man" in commerce, and not always without some justification. In a business like the electrical trade, however, the infinite variety of goods sold demands a medium between the manufacturer and retailer: the electrical wholesaler is necessary to provide a "clearing house" for a multitude of comparatively small orders which the manufacturing branches of the industry could not cope with economically.

The Sun Electrical Co., Ltd., is one of the largest, oldest and best known of the large electrical wholesale houses. Such a position necessitates the keeping of large and diversified stocks, meaning the occupation of a great deal of space, and the employment of a large staff for which accommodation is needed.

Starting in Charing Cross Road at the end of last century, the Sun Company, whose business grew as the electrical industry advanced, found its activities somewhat cramped a few years ago. It therefore acquired some adjacent premises and converted them into stores and offices. The rate of acceleration was so great, however, that the company soon had to consider another expansion and was fortunate enough to secure further premises—an old pickle factory—behind its existing building.

The building of a new wing on a site hemmed in on all sides was a formidable task, but it was carried through with marked success, and we were invited last week to inspect the results.

This time the company has taken advantage of the opportunity offered to construct some really up-to-date showrooms and offices. The provision of adequate showroom facilities for contractors, retailers, and their clients has been a potent factor in the company's success, and the arrangements which have now been made for the benefit of visitors should further enhance its reputation.

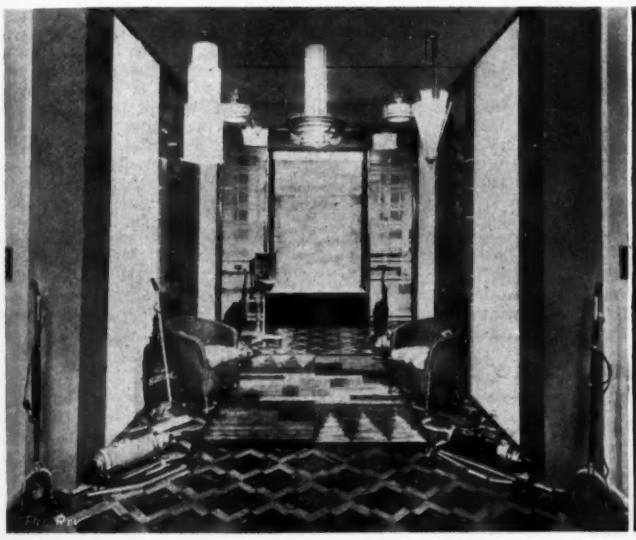
The whole of the interior decoration and furnishing has been carried out on tasteful and thorough lines. The three views of the interior which appear on this page convey some idea, though an inadequate one, of the excellent design of the showrooms. The first view exemplifies the practical application of modern artistic ideas, the lighting fittings, especially, being of the most recent development; the central fitting is particularly handsome. At the end of this apartment is a model bathroom which is equipped with various forms of water-heating apparatus, a Ferranti bathroom fire, towel rails, ultra-violet ray appliances, &c.

A very attractive corridor is seen in the second illustration. This is panelled in Australian walnut—a wood of handsome grain—and contains four showcases for domestic appliances flush with the wall. These have stainless-steel frames and glass shelves which are illuminated by tubular lamps concealed in specially-designed reflectors.

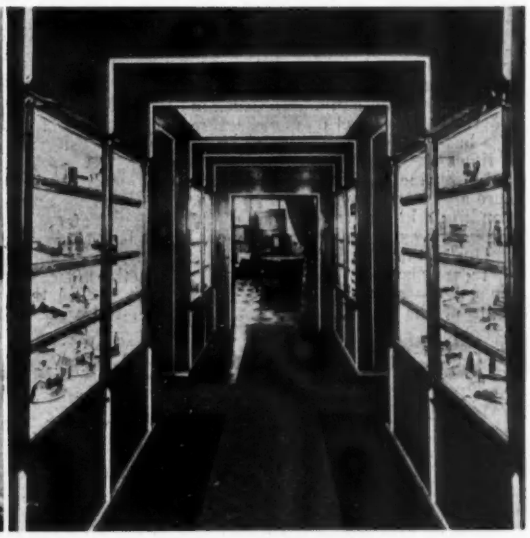
The most elaborate of the whole suite, however, is the radio demonstration room shown in the third picture. In this, many types of receiving sets, radio-gramophones and loud-speakers are to be seen and heard. The whole design is very original. Two special features are the use of a capacity "earth" provided by the metallised wall-paper and an aerial running round the wall to which any set can be connected by a clip. The storage space available (and fully occupied) is very extensive, some of it having been gained by excavation of the site, and the methods adopted for the handling of the goods are remarkably efficient. The same may be said of the office system and equipment. In such a business prompt and accurate accounting is almost the first essential; delay would quickly result in chaos.

The company has an authorised capital of £250,000, divided equally into preference and ordinary shares. In December last a public issue was made of 60,000 7½ per cent. £1 preference shares at par and they were quickly taken up.

Mr. A. G. Beaver, the managing director of the company, is a well-known figure in the electrical wholesale world. For several years he was hon. general secretary of the Electrical Wholesalers' Federation, and president in 1923. When the Electrical Merchants' and Manufacturers' Association was formed in 1928 by a number of large manufacturing and wholesale concerns he was elected chairman, a position which he still holds. Mr. Beaver says that the new extensions are evidence of the company's confidence in the future of the electrical industry.



A Showroom of Modern Design



Corridor and Show Cases

The Radio Demonstration Room

The Societies and their Doings

Swedish research, a proposed overhead-line specification, and the I.E.E. Students' continental tour are referred to below.

Research in Industry and Rationalisation

IN the treatment of a subject which is in itself of universal magnitude, Swedish conditions are specifically referred to in the paper MR. AXEL F. ENSTROM, director of the Royal Swedish Academy of Engineering Research, read before the SOCIETY OF SWEDISH ENGINEERS IN GREAT BRITAIN.

The fact that science and research should come to be marshalled among the working tools of industry in daily use, as effective means of competition, has not even yet quite penetrated the general consciousness, although it is an established fact. Sweden has with praiseworthy application accommodated itself to the demands of the new era. All the larger industrial undertakings have set up laboratories and engaged competent research staffs and there are now about fifty works research laboratories which employ some 600 people. The total cost of the industrial research work carried on in that country is probably in the neighbourhood of 4 to 5 million crowns. Moreover, central institutes, such as the Engineering University and the Academy of Engineering Research, the State Testing Institute, &c., carry out research work for the requirements of industry in cases in which the works in question have not the special knowledge of the subject required for the problem in hand. In certain quarters, especially in America, the control of manufacture and the testing of materials have, of course, points of contact with scientific research, at times slight and sometimes to a high degree. It is certain that scientific working methods and instruments are becoming more and more necessary in all such work, demanding a correspondingly higher competence of the controlling personnel.

Regarding the much talked of quality of being scientific, the nucleus of this idea is in reality the capacity for clear thinking. There are people who collect knowledge in the same way that one collects stamps, who habitually make use of the coded terms of the various branches of science, but who lack the capacity for the co-ordination of thought. Such are unfortunately not rare and they do harm by awakening distrust of the word science in the mind of the practical man of industry and cause him to overlook the invaluable services which well-qualified research is capable of rendering.

By rationalisation we mean measures which aim at increasing, improving, or cheapening production; it also embraces measures of a financial nature, aiming at the economy of capital. Whether the continued increase of the use of machinery, involving the discharge of superfluous hand-labour, is justifiable it is probably to soon yet to expect a definite answer. Economic history shows that development goes steadily in the direction of the direct exchange and relief of human labour by the introduction of tools. Occasionally it happens that the latter outstrips the former a little, then a crisis such as the present and many previous ones occurs. But experience shows also that the crisis subsides, equilibrium is established, and the tools produced earlier gradually come into full use. There is no reason to despair of the present depression being relieved in the same way by continued development bringing with it a new line of equilibrium between directly applied and indirect labour. Standardisation constitutes an important branch of rationalisation.

The industry of a small country, if it is to have any prospect of competing in the world's markets, must endeavour to concentrate on products of high quality. Swedish industry has had to do so, and has succeeded during the postwar period in attaining a footing in the world's markets. By purposeful incorporation of scientific research, well-equipped laboratories, and a highly-qualified staff with industrial activity it has been possible to keep quality at the summit, to follow the rapidly changing demands of the times for new products, and also to continue improving and cheapening manufacturing processes.

Suggested Overhead-line Standardisation

AT the monthly May meeting of the OVERHEAD LINES ASSOCIATION, MR. J. R. HARDING's suggested specification for overhead lines was discussed.

MR. J. A. SUMNER said that standardisation was particularly necessary in the case of steel towers, and should take into account the arrangement of the conductors on account of the effects of induction.

MR. A. PETRIE suggested that when all the machining, drilling, tapping, &c., of steel poles were done before galvanising, sherardising would fulfil the requirements much more satisfactorily. He did not advise the use of brass in contact with zinc-coated steel.

MR. W. FENNELL differed from the author's statement that in the case of 33-kV lines it was becoming general to use suspension insulators; for wood-pole lines most would surely prefer pin insulators. The H pole was expensive, big, and ugly, and its standardisation would be a retrograde step. The total absence of figures from the author's proposed specification rather detracted from its value. Real technical calculations of the strengths of foundations were absent at the present time. There should be no joints in conductors except at section insulators. Whilst appreciating the trouble the author had gone to in preparing the specification, he strongly opposed adopting a sort of consulting engineer's specification which contained a great deal of rigmarole, but did not mean much.

MAJOR THEODORE RICH said paints of a bitumen or tar character did not always seem to be satisfactory. The extra safety to be obtained from double conductors at crossings was illusory. He urged the need for stocks of steel tower parts to be kept easily accessible in all parts of the country, which could be made up into various combinations.

MR. R. F. MARKHAM explained that he had erected a large mileage of 33-kV lines equipped with pin insulators, 0.1-in. conductors, and spans of 425 ft. without any trouble; moreover, the cost was lower than if suspension insulators had been used. It was better to specify the area of an earth plate rather than other dimensions. In the Norwich rural scheme 1,800 poles were being erected with earth plates 9 in. wide, curved, and 3 ft. long, which could be slipped into the bored holes much better than 18-in. square plates. Clause 11, relating to stays, seemed unreasonable.

MR. ANDERSON referred to the liability so to frame specifications that they barred progress. Under the present regulations it was impossible to show what wood cross arms could really do. They were not liked on account of salt deposits, but experiments were being made with bleeders by the sea, and there were cases in which wood arms were giving good service.

MR. C. H. RIDPATH suggested that for higher tension the Commissioners' factor of safety of 2 should be accepted. Aluminium cone connectors should be absolutely pure to avoid corrosion.

MR. J. H. C. BROOKING pointed out that lines fitted with bird guards had been perfectly immune from salt-spray trouble.

MR. WADE said that the A pole had been a very good friend; perhaps it had been left out of the specification by mistake. The depth a pole should be in the ground depended on the locality and the nature of the ground.

The AUTHOR explained, in reply, that the proposed specification was drawn up on general lines. It would be impossible to put forward any specification at the present time which did not comply with the existing requirements, but any such specification would necessarily be subject to revision and to being brought up to date from time to time. Some of the suggestions were very rough and ready, but he had felt it was better to do that than not to make any reference to certain matters at all.

I.E.E. London Students' Summer Meeting

FINAL details of this year's summer meeting, which is being held from July 18th to 28th inclusive in Northern Italy and Switzerland, are now available. The total cost, including all travelling expenses, hotel accommodation, meals *en route*, and expenses in connection with the trip to the Mese central station, Vernayaz, and Sion will be £17 4s. 6d. each. (Hand luggage is only allowed.) About 60 student members have signified their intention of joining the party. Any further applications must be sent immediately to Mr. T. H. Lockett (hon. assistant secretary), c/o Messrs. Dawson, Payne and Lockett, Ltd., Dean Street, London, E.C.4, at the same time forwarding £1 as a deposit *direct to Messrs. Thos. Cook & Son*, Berkeley Street, W.1, mentioning the Students' Section and reference B.H.55/53153. The programme is:—

July 18th (Saturday).—Depart from London (Victoria) at 10 a.m. (route *via* Newhaven-Dieppe-Paris), arriving at Milan at 12.50 p.m. on July 19th.

On July 20th and 21st visits will be paid to the works of the Pirelli Cable Company and to the new Milan railway station and locomotive repair shops. Leaving Milan at 5.15 p.m., a journey will be made along the shores of Lakes Lecco and Como. The night will be spent at Chiavenna.

On July 22nd visits will be paid to the Mese central station, the hydro-electric plant at Prestone, the dam for the reservoir at Monte Spluga, and the Spluga Pass, returning to Milan in the evening.

On July 23rd, after a visit to the Milan trunk exchange and probably to the broadcasting station, the party will leave Milan at 1.30 p.m. and travel to Glion, arriving there at 9 p.m.

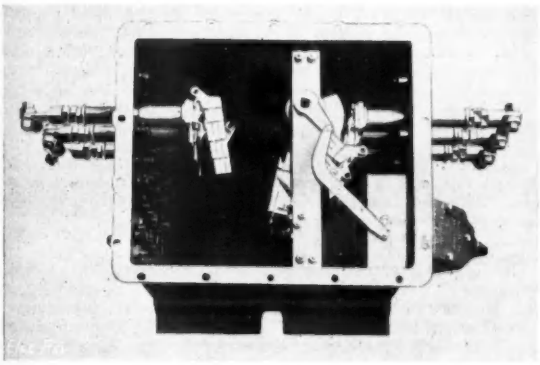
July 24th, 25th, and 26th will be occupied in visits to the Vernayaz power station of the Swiss Federal Railways, the hydro-electric scheme in progress at Sion in the Rhone Valley, and in an auto-car excursion round the environs of Montreux (free). Departure for London will be made at 9.27 p.m. on July 27th, arriving at Victoria at 6.43 p.m., *via* the Paris Dieppe-Newhaven route, on Tuesday, July 28th.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Underground Disconnecting Switch

FERGUSON, PAILIN, LTD., Higher Openshaw, Manchester, have developed a manually operated disconnecting switch designed to control underground network systems with loadings up to 1,200 A at 11,000 V, actually making and breaking load. It is oil immersed, watertight and drip proof. There are three switch positions, on, off and earth; in the last the incoming cable is earthed and the feeder terminals left free. The compact design provides quick, simple, positive, safe and reliable operation, robustness and durability. All parts of the switch can be rendered easily accessible for inspection or adjustment, and provision is made for thoroughly testing the switch without opening the tank. The tank is of fabricated steel construction throughout, and supports the entire mechanism. Provision is made for cable entry by means of cast-iron compound-filled boxes, which can be located in a number of positions to suit requirements. The top plate is of sheet steel, and has an aperture for oil filling and insertion of an oil gauge. A robust double handle operates the switch through direct rotary motion, and it can be padlocked in any one of the three positions. "Bakelite"-insulated testing plugs can be inserted in the top plate to enable any necessary tests to be carried out. A 6-way auxiliary switch is suitably interlocked with the main switch, and is served by a cast-brass gland for the auxiliary cables. The permanent contacts

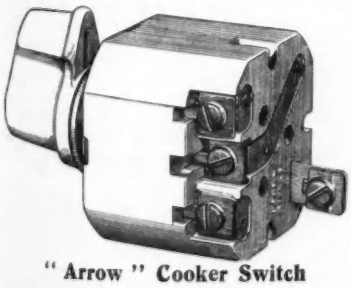


F.P. Disconnecting Switch in "Earth" Position

are copper fingers between which an extended curve on the moving contact arm passes, thus making contact in all three "on," off," and "earth" positions. The feeder contacts are similarly designed, but also have flared jaws to receive the moving contacts easily. The earth contacts are of the copper-clip type. It is necessary to remove a catch before it is possible to earth the feeder cables. The moving contacts are copper blades designed for perfect alignment with the flared jaws of the feeder contacts. Spring-controlled arcing tips are provided for each pole, so that burning of the main contacts is prevented and the final rupture of the circuit is effected with a quick-break action. These tips can be easily replaced at small expense.

A Cooker Switch

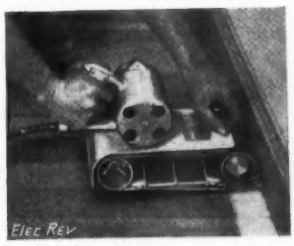
ARROW ELECTRIC SWITCHES, LTD., 79, Great Queen Street, Kingsway, W.C.2, have during the past two years brought out a number of new model switches with definite improvements over the previous side and back connected switches offered by the company in 1929. Important changes and improvements have been made in the switch, including the one-hole fixing method. The new side-connected cooker switch now offered embodies the improvements up to date. It is considerably smaller in size, being 2¼ in. diameter by 1¾ in. deep, and has a full 10-A, 250-V rating. The switch mechanism is essentially the same as in previous "Arrow" switches, with the exception that additional insulation has been provided, giving the switch still larger overload carrying capacity. The insulation used is high-quality "Bakelite" linen mica throughout. The switch is arranged with three terminals at the side and the R.L. terminal set back for bus-bar mounting. The terminal contacts are of the new design, providing an especially "tight grip" for wiring. The switch is arranged for one-hole fixing and is interchangeable with previous one-hole-fixing switches, as well as two-screw-fixing types. It may be fitted in the old style cooker using only the two-screw fixing, without the necessity of making any changes in the switch box or switch control panel. The switch is dustproof, being covered by a heavy plate countersunk in four positions into the porcelain, and firmly held by two screws. Above each terminal are ventilation openings. The handle is unique, as the one-hole fixing nut is recessed into the handle when it is screwed down, thus concealing the nut and making for a neater appearance of the cooker panel. In addition the cooker panel is protected by a metal washer supplied with the switch, so that the handle rests against this washer and does not mark the panel. The body is of high-quality white glazed porcelain.



"Arrow" Cooker Switch

A Portable Belt Sander

The "B.E.N.-Skilsaw" portable belt sander recently introduced by B.E.N. PATENTS, LTD., 92, Tottenham Court Road, W.1, weighs only 18 lb., but has a sanding area of more than 31 sq. in. over which the weight of the machine is evenly distributed. The flexible pad over which the belt runs make possible the finest kind of finishing work. The belt tension can be instantly adjusted by convenient hand screws, and the belt speed is over 1,700 ft. per min. The machine employs a ½-h.p. universal motor, and the overall dimensions are 7 in. by 14 in. by 9 in. high. The belt size is 4¼ in. by 26 5/16 in. The operating switch is conveniently placed in the handle.



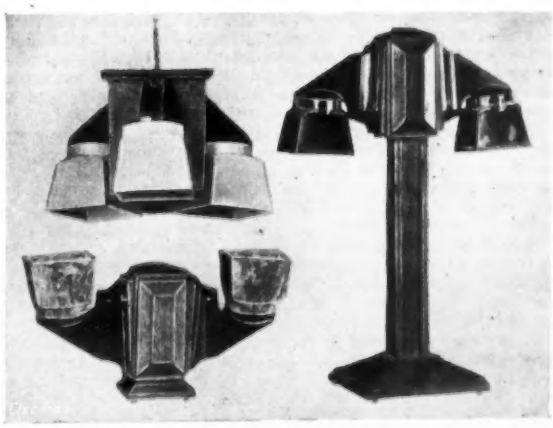
"B.E.N.-Skilsaw Sander"

Anti-dazzle Lamp

A test was recently made on a motor-car lamp described as the "Duplo" marketed by PHILIPS LAMPS, LTD., 145, Charing Cross Road, W.C.2, which, it appears, offers a satisfactory solution of the dazzle problem. The "Duplo" has two filaments of equal lighting power, one providing a powerful beam for normal use. When necessary a switch cuts out the normal filament and brings into action the second filament which is partly enclosed in a metal cup, thus directing its light to the upper part of the reflector, whence it is directed downwards.

New Lighting Fittings

The new "Quakerlite" lighting fittings placed on the market by SILAS QUAKER, LTD., of 110, Park Street,



Some of the "Quakerlight" Fittings

Camden Town, London, N.W.1, have many attractive and ingenious features which will be much appreciated by electrical installation engineers. Of outstanding interest is the fact that although only a single type of lamp bracket is supplied, an innumerable variety of different fittings can be built up by means of specially constructed wall-plates, standards, and pendants. The bracket itself (incorporating a press switch if desired) is of moulded "Bakelite," and can be supplied in various colours and imitation-wood finishes. The construction of the lampholder and contact plugs is entirely new and extremely neat in design; strip connectors run from the plug to easily accessible terminals within the bracket, all fittings being supplied completely wired. The lamp shades are supplied either in plain or mottled "Beatl" or in hand-coloured parchment. A feature of the shades themselves is that they simply push on to the bracket and are held securely in position by a concealed spring ball device, thus avoiding the customary tedious screwing up and unscrewing of shade rings. The neat and compact lines of the fitting make it exceptionally adaptable, and it is equally effective whether used in the downward position for direct lighting or in the inverted position.

The Future of the Tramways

The comparison of merits of the railed vehicle with those of the electric trolley and the oil-propelled 'bus

THE 21st annual Congress and the 34th annual general meeting of the Tramways, Light Railways and Transport Association was held in Margate on Thursday and Friday, May 28th and 29th, the chairman of the Council (Mr. E. H. Edwardes, general manager of the South Lancashire Transport Co.) presiding.

The Association met on Thursday morning, May 28th, in the Pavilion and Winter Gardens, and was given an official welcome on behalf of the Margate Corporation by his Worship the Mayor (Councillor P. B. Osborne, J.P.).

The CHAIRMAN mentioned that he had had an opportunity of riding upon what he regarded the only modern tramcar in existence which had been put into service on the London United Tramways system in London by Mr. Spencer, and having on that occasion also ridden on a latest L.G.O.C. omnibus and a modern trolley 'bus, he had come to the conclusion, as did all those who took part in that demonstration, that the acceleration was marvellous and that the comfort and noiselessness were far beyond those of the petrol 'bus.

The Council's report and accounts were adopted, and the following were elected to fill vacancies on the Council:—Messrs. W. T. Hill (managing director, Titan Trackwork Co.), G. W. Fletcher (Metropolitan-Vickers Electrical Co.), L. E. Harvey (engineer and general manager, Ilford Corporation Tramways), Ben England (general manager, St. Helens Corporation Tramways), and T. G. Richardson (Rhondda Tramways Co.).

A vote of thanks was accorded to the retiring members of Council, *viz.*, Messrs. Baker, Hoare, Holt, Priestley, Stanley, and H. L. White.

The first paper to be read at the Congress was "Odds and Ends" by Mr. J. A. Forde (engineer and manager, Isle of Thanet Electric Supply Co.), of which a report was given in our last issue.

Discussion on Mr. J. A. Forde's Paper

COUNCILLOR GRAHAM FORD (Leeds) said that tramways were of the utmost importance for transporting large masses of people quickly and at cheap fares. The cost per mile in Leeds was about 0.52d. for the tramways and the maximum fare was 2d. for any distance. A profit was made last year on the combined tram and 'bus undertaking of £102,000, of which £67,000 had been handed over for the relief of rates and £29,000 written off the loss on the 'bus undertaking. The trams were run on power generated from our own fuel whereas petrol and rubber were imported. Tramway undertakings also provided orders for the metallurgical industries. Moreover, he was convinced that if tramway authorities had kept their undertakings up to date there would not have been the present outcry against them. The municipalities had taken far too much money out of the profits for relieving the rates instead of spending it on the tramways.

MR. R. S. PILCHER (general manager, Manchester Corporation Tramways Department) expressed the view that whilst it would be impossible at once to scrap all the tramways, he did not believe there would be any running in this country in 20 years time. Experiments in Manchester in the substitution of tramways by 'buses on certain routes went to prove this. One of these experiments involved 8 miles of route to Altrincham. On this route had been running the most modern tramcars seating 80 passengers and capable of a speed of 30 miles per hour on the level. The tramway receipts were 14d. per mile and the expenses were 17d. per mile, and there was a loss of about £200 per week. As soon as the change over to 'buses was made the expenses dropped to 14d. per mile and the receipts rose to 15d. per mile. From these three experiments it seemed to him that the public were demanding 'buses no matter how good or how fast the tramcar might be, and transport managers must give the public what it wants. It had been said that the trolley omnibus had a higher rate of acceleration than the motor 'bus, but his experience did not agree with this. Manchester Corporation had had two crude-oil engine 'buses running for some months quite satisfactorily, and the operating costs were 2d. per mile less than with the petrol 'bus. This type of vehicle was no longer an experiment.

MR. C. J. SPENCER (general manager, Metropolitan Tramway Companies) suggested that the excellent results claimed in Manchester after the substitution of 'buses for trams had been obtained on routes where old types of tramcars had been replaced by modern 'buses. He had found that the really modern tramcar operated at a higher speed than the modern 'bus. (In this he was supported by Mr. W. E. Ireland, rolling stock superintendent L.C.C. tramways). Visitors from abroad often asked whether we in this country studied these problems on a mathematical basis. Operators on the Continent and in America had definitely come to the conclusion that when the traffic density was above a certain figure and when the characteristics were of a certain order, then the railed vehicle was the only possible vehicle to use. There was a field for tramways, motor 'buses, and trolley vehicles. We in this country were far too casual in this matter.

The Question of Road Maintenance

MR. FRED. BLAND (Messrs. Edgar Allen & Co., Ltd.) complained of the apathy of tramway managers in not catering properly for the public. The result had been that when a new and up-to-date vehicle came along in the form of the 'bus, the public showed a preference for it. An aspect of the substitution of 'buses for tramways was that the Highways Committees of our large towns would have to provide more money for road repairs and maintenance; that had already been the experience in Sheffield, where an extra sum of £9,000 per annum was required owing to the change-over to 'buses on certain routes. That money had to be found by the ratepayers instead of by those who used the vehicles, as was formerly the case. In regard to congestion of the streets, in Sheffield there were 440 tramcars, and to carry the same number of people 650 'buses would be necessary. Finally, he claimed that from the point of view of accidents to passengers, tramcars were the safest form of transport, the figures showing that only one in 41 million passengers carried was killed.

CAPTAIN W. VANE MORLAND (general manager, Walsall Corporation Tramways) said that there was justification for replacing tramways, when the tracks and vehicle had to be renewed, by a more mobile form of traction. In Walsall there were many miles of single line with passing places, and to suggest that these should be reconstructed was ludicrous.

MR. A. W. A. CHIVERS (British Electrical Federation, Ltd.) said that tramways had been built in places where, in the light of the present circumstances, they should not have been constructed, but the trams were the only means of street passenger transport at the time, and they had served an extremely useful purpose.

MAJOR T. C. AVELING (Messrs. J. I. Thornycroft, Ltd.) pointed out that it was possible to concentrate 'buses at any spot where the demand arose with much greater facility than was possible with tramcars.

The Social Functions

The Association was entertained at luncheon at the Queen's Hotel by the directors of the Isle of Thanet Electric Supply Co., Mr. H. Brown, a director of the company, presiding.

Responding to the toast of "The Tramways, Light Railways, and Transport Association," proposed by the chairman, MR. C. J. SPENCER called attention to the fact that by the recent change of name of the Association to include the general word "transport," the Association had declared its interest in more than one form of traction. The tramways and the railways from their inception had been required to do all sorts of things supposed to be in the interests of the public, but the motor-'bus until recently was free of very much in the way of control. Under the Road Traffic Act, however, the motor-'bus also would be controlled in the future.

The annual dinner was held in the evening at the Queen's Hotel, Col. Sir Joseph Nall (vice-president) presiding. There was a company of some 250 members, ladies, and guests.

The CHAIRMAN, proposing "Our Guests," expressed regret at the absence of the president of the Association, Sir Arthur Stanley, and sympathy in the sudden death of the town clerk of Margate at the time when he making all the local arrangements for the Conference.

The toast was responded to his Worship the Mayor of Margate, on behalf of the Corporation, by Dr. G. T. Moody, a director of the Isle of Thanet Electric Supply Co., and by Councillor I. Brassington, of Manchester, on behalf of the Municipal Tramways and Transport Association. Councillor BRASSINGTON spoke strongly in favour of tramways, and referred to the fact that at Manchester last year the sum of £101,000 was paid in relief of rates out of the profits of the tramways undertaking.

The other toasts were those of "The Ladies," proposed by Mr. E. H. Edwardes and responded to by Mr. J. A. Forde, and "The Chairman," proposed by Sir John Timpson. The CHAIRMAN, in his response, expressed thanks to the secretary, Mr. A. de Turckheim, for the admirable arrangements made for the Congress.

The annual dinner, a most enjoyable function, was run on quite novel lines. The speeches were few and short; there was an excellent musical programme during the meal, and dancing and a cabaret entertainment afterwards.

Friday's Agenda

On Friday morning, May 29th, a paper on "The Operation of the Road Traffic Act" was read by Mr. R. G. Pittard, general manager of the Bristol Tramways and Carriage Co. Tramways, of course, are exempt from the Act, as also are trolley 'buses, except as regards certain matters relating to licensing of drivers, and details of that nature. Consequently, the discussion related solely to the operation of motor-'buses.

On Thursday afternoon, May 28th, a visit was made by 'buses to Canterbury, where tea was provided by the Isle of Thanet Electric Supply Co., and on Friday, May 29th, a trip was made in the same way to Folkestone, *via* Sandwich and Dover, tea again being kindly provided by the company.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

The Glasgow Industrial Exhibition

Electricity plays an important part in the industrial exhibition which Mr. W. Adamson, Secretary of State for Scotland, opened in the Kelvin Hall, Glasgow, on May 29th in connection with the city's Civic and Empire Week. The Craigpark Electric Cable Co., Ltd., shows a machine demonstrating the application of rubber insulation to copper conductors, high-speed taping and braiding machines. Specimens of different types of manufactured electric cables as well as finished lengths of numerous types of wires, cables, and flexibles are also shown. The Glasgow Lighting Department is showing exhibits relevant to municipal lighting. Messrs. Archibald Low & Sons, Ltd., have a varied selection of "Highlow" electric hot water tanks, ovens, circulators, and tubular heaters. The Singer Sewing Machine Co., Ltd., shows electric motors for sewing machines, attachments, and accessories. The exhibit of James Howden & Co., Ltd., and associated companies, include turbovane fan wheels for mechanical draught in power stations and industrial boiler plants, and the electrically-controlled Turnbull-Karnath valve. Messrs. Barr & Stroud, Ltd., Glasgow, are exhibiting electrical transmitters and receivers, electro-mechanical transmission gears, electro-mechanical relays, &c. Tubular heaters are shown by the J. P. Tubular Heater Co., and Mr. C. F. Howden is exhibiting ventilating fans, electric and belt driven, hot-water boilers, radiators, &c.

Guides to Foreign Markets

Further publications of the "Hints for Commercial Visitors" series have been issued by the Department of Overseas Trade. These deal with Poland (Ref. No. C.3546), Ecuador (Ref. No. C.3547), Cuba, Dominico and Hayti (Ref. No. C.3549) and El Salvador (Ref. No. 3551), and they contain a quantity of general information useful to travellers, as well as particulars of trading facilities.

Kingston's New Showrooms

The commodious new showrooms and offices of the Kingston-on-Thames Electricity Department, at 17, High Street, were opened last Monday by the Mayor, Councillor W. Bell, J.P.

Australian Tariff Recommendations

Among the recommendations made by the Australian Tariff Board, as the result of recent inquiries, the Melbourne *Argus* reports the following:—"In applications for increased duties on copper wire, copper pipes and tubes, brass wire, brass tubes, aluminium wire, bars, rods, strips, and sections, copper-clad steel tubes, paper-insulated lead-covered telegraph and telephone cables, weatherproof braided wire and cable, brass-strand and aluminium steel-cored conductors, the board recommended no action. It was recommended that the duty on aluminium tubes should be increased to 15 per cent., 20 per cent., and 25 per cent., and on cotton-covered wire to 30 per cent., 40 per cent., and 45 per cent. under the British preferential, intermediate and general tariffs."

The 1931 Electric Fan Season

The advent of warmer and, we trust, continued fine weather causes us to consider once again the question of ventilation. The innumerable advantages of the electric fan, its negligible operating costs and its high state of efficiency have convinced users that the once prevalent idea of it as a luxury is a mistake. Particulars have reached us from a number of fan manufacturers of several new models, as well as details of publicity campaigns, which should make the coming season a successful one. In addition to its already extensive range of desk and bracket fans, the EDISON SWAN ELECTRIC CO., LTD., is introducing a dainty new "Ediswan Junior" model finished in a delicate silver-grey shade which blends harmoniously with any surroundings. This fan is fitted with a tilting adjustment and can instantly be converted to hang upon the wall. It has a single speed with a starting switch in the base. The GENERAL ELECTRIC CO., LTD., which has for several years undertaken extensive fan publicity campaigns, this year has prepared a number of artistically coloured showcards, broadsides, and folders for use of dealers. The display of these in windows, showrooms, and on counters should materially assist the purpose of the general advertising scheme. The folders are supplied overprinted with the dealer's name and address. The new "Invicta" fan produced by Messrs. FALK, STADELMANN AND CO., LTD., has several attractive features. It has a cast-iron body and base, black enamelled, with polished 8-in. brass blades and guard. A snap action switch is embodied in the base. A substantial reduction has been made in the price of the "Efesca Antarctic" fan, a 10-in. model fitted with a universal motor. "Efesca" exhaust ceiling and revolving fans have also been reduced in prices in several instances. The SUN ELECTRICAL CO., LTD., has placed on the market an inexpensive model with 8-in. blades, which should have a good sale. Among the numerous fans supplied by Messrs. L. G. HAWKINS & CO., LTD., of particular interest is the "Supreme," a well-constructed and serviceable appliance selling at a moderate price; an attractively-coloured counter display stand is being supplied free by this company on receipt of orders for "Universal" ventilators. The already wide range of fans produced by Messrs. MARELLI & CO., LTD., has been further augmented by the introduction of a new oscillating type, the "Sirio," which is superseding their 10-in. "Delio" model. A new catalogue received from Messrs. DRAKE & GORHAM WHOLESALE, LTD., shows a wide variety of models of all types available. A range of four patterns is claimed by Messrs. JOHN SHAW & SONS (WOLVERHAMPTON), LTD., to be sufficient to cover all regular requirements, and the prices are calculated to meet all purses.

New Sub-station and Showrooms for Walworth

The ceremony of laying the foundation stone of the Southwark Borough Council's new electricity sub-station and showrooms in Penrose Street, Walworth, was performed on May 28th by Councillor A. J. Patrick, chairman of the Electric Light Committee. The Mayor of Southwark (Alderman J. T. Greenwood, J.P.), who presided, gave some particulars of the new building and outlined the remarkable progress made by the electricity undertaking during recent years. The construction of the new sub-station has become necessary in order to deal with the bulk supply to be taken from the City of London Electric Lighting Co., Ltd. Adjoining the existing engine room will be built the transformer room, which will accommodate initially two 2,000-kW rotary convertors, with provision for the addition of two further sets at a later date. A switchboard gallery will be provided along the western wall, while the h.p. gear will be situated at the northern end. A large basement extending under the whole of the transformer room will accommodate the main cables. Next to the transformer room, and facing Penrose Street, will be the showroom, behind which will be a room specially equipped for the demonstration of all kinds of electrical fittings and domestic appliances. The erection of the new buildings is being carried out by Messrs. F. & H. F. Higgs, Ltd.

Social Events

The annual sports meeting promoted by the united sports clubs of Crompton Parkinson, Ltd., and the Hoffman Manufacturing Co., and Marconi's Wireless Telegraph Co., Ltd., was held on Whit Monday on the Crompton Parkinson Club's ground. The open events were well supported by prominent athletes, and there was keen competition in the events, confined to members of the works' clubs, for cups presented to the clubs gaining the greatest number of points. Both the Godfrey Isaacs Cup for men's events and the Colley Pryke Cup for ladies were won by Hoffmans, Crompton Parkinson being second and Marconi's third in each case. Numerous directors and officials of the three companies were present, including Colonel Crompton. Music was provided during the afternoon and for dancing at the evening fête by means of Marconi gramophone amplifiers.

There was a very close finish in a cricket match played recently at the Dick Kerr Club, Ashton Park, between teams representing the works and staff of Siemens Lamp Works. The works eleven, batting first, put up 51 runs to defeat the staff total by a single run. The best individual performance was that of J. N. Aldington, who scored 19 not out, and had the remarkable bowling figures of 8 for 16.

The annual sports meeting of the London establishments of the General Electric Co., Ltd., is being held to-morrow (Saturday) at the company's sports ground, Preston Road, Wembley.

New French Companies

Among the companies recently formed in France are the following: La Compagnie Française des Lampes, Phares, Diffuseurs et Reflecteurs "Cesar," Paris (113, Rue de Turenne), capital £40,000; La Compagnie de la Chute de Montalieu, Grenoble (155, Cours Berriat), £16,000, to establish a small hydro-electric station; and La Société l'Entreprise Electrique L. Lesens, Paris (220, Avenue du Marne), to install high- and low-pressure transmission systems.

Recent Contract

Messrs. FREDERICK THOMAS & CO., LTD., have received an order from Messrs. Cackett, Burns Dick & MacKellar, architects, Newcastle-upon-Tyne, for the manufacture of the special bronze pendants required for lighting the new Newcastle-upon-Tyne Police Courts. The electrical contractors are Messrs. Falconar, Cross & Co., Ltd., Newcastle.

Prices of Materials

Messrs. F. Smith & Co., report, June 2nd: Copper (electrolytic) bars, sheets and wire rods, no change; ditto ditto h.c. wire, 7d., 1/16d. dec. Silicium bronze wire, no change.

Messrs. Edward Till & Co. report, June 2nd: India-rubber, Para fine, 4d., 1d. decrease.

Messrs. James & Shakespeare report, June 2nd: Copper bars (best selected), sheet and rod, £70, £3 decrease. English pig lead, £12 15s., 10s. decrease.

German Foreign Electrical Trade

The recently-issued official returns show that the imports of electrical machinery and apparatus into Germany during the three months ended with March last attained a value of £509,752, as compared with £723,850 in the corresponding period of 1930. There was also a decline during the same period in the exports of similar material from Germany—from £7,396,350 to £6,336,900.

Local Exhibition

An electrical exhibition has been opened at Durham Town Hall by the County of Durham Electrical Power Distribution Co., Ltd.

Book Notices

With its June number (No. 37-Vol. iv) "Distribution," the house organ of W. T. Henley's Telegraph Works Co., Ltd., celebrates its third birthday anniversary. The occasion has been used to produce a special issue with a cover designed by Mr. F. H. Mason, R.I., depicting a scene on the River Thames, off Gravesend. Several articles on a wide range of subjects are included by members of the staff and by friends of the company. Somewhat off the beaten track is a review by Mr. W. H. Nichols, of service cut-out design, in which he is a recognised authority. This article traces the various stages of development of these very important accessories right back to the primitive types met with in 1890.

From Siemens-Schuckert (Gt. Britain), Ltd., we have received a copy of a 34-page booklet giving an exhaustive description, in English, of the Shannon hydro-electric scheme from the pen of Herr F. Schrobenhauser, the chief engineer of the Siemens-Schuckert Works. In addition to full details of the scheme, the booklet contains reproductions of photographs of many hitherto unpublished features of the installation.

We have received from the Carron Company the fifth of its series of pamphlets, "Famous Men and Carron Works," the present publication relating to William Symington, the constructor of the engines for the first steamship built in Great Britain.

International Commission on Illumination—a 24-page booklet on its origin, organisation, and work.—London: The Commission, 32, Victoria Street, S.W.1.

"Steam Turbine Operation," by W. J. Kearton. Pp. xi+300; figs. 176. London: Sir Isaac Pitman & Sons, Ltd. Price 12s. 6d. net.

Trade Announcements

FENEMORE, HOWLETT & CO., LTD., electrical engineers, have opened new premises at 124, High Street, Eton.

The London office of the PULSOMETER ENGINEERING CO., LTD., has been removed to 39, Victoria Street, Westminster, S.W.1. The telephone number is Victoria 4565, and the telegraphic address Pulsometer Parl, London.

The SUN ELECTRICAL CO., LTD., 118-120, Charing Cross Road, W.C.2, informs us that during the months of June, July and August its hours of business will be from 8.45 a.m. until 5.30 p.m.

Messrs. BEST & LLOYD, LTD., have sold their motor fittings business, known as the "A.P. Department," to Messrs. Benton and Stone, Ltd., Bracebridge Street, Birmingham, and on and after June 20th correspondence should be addressed to the latter company.

The HANSON ELECTRICAL SUPPLIES, LTD., announces in a circular to the electrical contracting trade that it has recently commenced business at 92a, Baker Street, W.1.

The MAGNETA TIME CO., 5, Tothill Street, S.W.1, has been appointed British agent for Stromberg electric time recorders.

The Leeds office of the FOSTER ENGINEERING CO., LTD., has been transferred from 11, New Station Street to 21, York Place. (Telephone: Leeds 28517/8.)

The B.E.A.M.A. Index

The "Index of Activity" of the British Electrical and Allied Manufacturers' Association gives a figure of 79.9 for April (1924=100), as compared with 77.8 for March and 113.6 for April, 1930. On the 1924 basis the output of electricity by authorised undertakers was 171 per cent., against 204 per cent. in March and 167 per cent. in April, 1930.

New Catalogues and Lists

ALAN WRIGHT, 117, Victoria Street, London, S.W.1.—An illustrated catalogue of "Inventum" water heaters; also a leaflet describing the "Mix-a-tap," a new "Inventum" appliance providing hot, cold or mixed water.

L. E. FRASER, 22, Ely Place, Holborn, London, E.C.1.—A list illustrating a new range of table, bedside and reading lamps, typewriter lamps and adjustable reflector lamps for home or office use.

DRAKE & GORHAM WHOLESALE, LTD., 77, Long Acre, London, W.C.2.—The new season's list of electric fans (pamphlet No. 492).

The EDISON SWAN ELECTRIC CO., LTD., 123-5, Queen Victoria Street, London, E.C.4.—Leaflets H.C. 665 and 666, giving particulars of the latest "Ediswan" fans; also publication T.659, relating to Tungar battery chargers and a.c. rectifiers.

A. REYROLLE & CO., LTD., Hebburn-on-Tyne.—A schedule showing reduced prices of plugs and sockets and spare parts.

HENRY JOSEPH, 11, Red Lion Square, High Holborn, London, W.C.1.—A folder illustrating the latest models of "Grawor" loud-speakers, gramophone pick-ups, &c.

BRITISH INSULATED CABLES, LTD., Prescot, Lancs.—Illustrated booklets relating to railless electric traction and "Copperweld" wires and strand; also catalogue P.260 (replacing P.203), relating to "B.I." mining boxes.

BROOKHIRST SWITCHGEAR, LTD., Northgate Works, Chester.—A leaflet dealing with a.c. automatic contactor control gear.

BOULTON & PAUL, LTD., Norwich.—Leaflet B40/2, dealing with the "Boulton" self-lubricating electric house pump.

The METROPOLITAN-VICKERS ELECTRICAL CO., LTD., Trafford Park, Manchester.—An illustrated booklet referring to the machinery installation of the M.V. "Lockfyne."

FALK, STADELMANN & CO., LTD., 83-93, Farringdon Road, London, E.C.1.—The new season's catalogue of electric fans; also a leaflet relating to "Efesca" lanterns for shop front and general outdoor lighting, and a revised price list for cables and flexibles.

The LONDON ALUMINIUM CO., LTD., Westwood Road, Witton, Birmingham.—A booklet entitled "What we can do," demonstrating the various uses of aluminium and light alloys in industry.

JOHN SHAW & SONS (WOLVERHAMPTON), LTD., Wolverhampton.—A folder dealing with the 1931 season electric fans.

LOUIS HOLZMAN, LTD., 37, Newman Street, London, W.1.—A leaflet dealing with the use of "Hydra" condensers for the elimination of interference with radio reception caused by electrical machinery.

The MARCONIPHONE CO., LTD., 210-212, Tottenham Court Road, London, W.1.—Four striking showcards referring to "Marconi" valves and "Marconiphone" radio receivers.

S. SCHNEIDER, 3, Hanover Court, Moor Lane, London, E.C.2.—A leaflet describing the "Mary Ann" vacuum cleaner.

IGRANIC ELECTRIC CO., LTD., 149, Queen Victoria Street, London, E.C.4.—Publication No. 6712, referring to "Igranic" amplifying apparatus.

STROMBERG ELECTRIC TIME RECORDERS, 5, Tothill Street, Westminster, London, S.W.1.—Pamphlets giving details of "Stromberg" automatic time stamps, job time recorders, and employés' "in and out" time recorders; also a list of users of the "Stromberg" time-recording system.

JAMES GORDON & CO., LTD., Windsor House, Kingsway, London, W.C.2.—An illustrated pamphlet (No. A2) dealing with the Gordon thermostatic high and low level alarm and distance indicator for water-tube boilers.

BROOK MOTORS, LTD., Empress Works, Huddersfield.—List No. 295, showing prices and characteristics of "Cylent" electric motors.

NATHAN & ALLEN, 131, Victoria Street, Westminster, London, S.W.1.—An illustrated pamphlet (No. '43 De) giving particulars and prices of "Sauter" hand-wind and electric-wind time switches.

"Magnet" Appliances in Australia

The *Electrical Trader* (Sydney) reports that arrangements have been concluded for the manufacture in Australia of such "Magnet" electric heating and cooking appliances as can be efficiently and economically produced there. Hecla Electric Pty., Ltd., has been entrusted with the future manufacture of "Magnet" appliances, which will be distributed, as in the past, by the British General Electric Co., Ltd., throughout Australia.

Committee "D"

At a recent meeting of the Council of the Electrical Contractors' Association it was reported that after three years of arduous work, Committee "D" had now arrived at a point when the results of its negotiations are to be conveyed to the various interested associations. Although it could not be said that finality had yet been reached, the various points contained in the Fair Trading Policy issued by Committee "D" had been very carefully considered and systematically argued between the representatives of the various sections of the industry, and it was hoped that it would not be long before the document was adopted by all associations interested and became the standard practice of the industry.

Mica Insulation

A copy of a publication entitled "Mica for Electrical Purposes" has been sent us by the Micanite & Insulators Co., Ltd. It contains a considerable amount of data on the subject, and should prove of interest to readers in view of the article published in the ELECTRICAL REVIEW of May 29th, and of the letter appearing to-day in our "Correspondence" columns.

For Sale

Secondhand voltage boosters and d.c. ampère-hour meters are offered for sale by the D.C. Electric Co.

Messrs. Ernest Newell & Co., Ltd., has for disposal one d.c. generator.

Offers are invited by the Treloar Cripples' Hospital, Alton, for a steam-driven d.c. generating set.

(See our advertisement pages to-day.)

The "Empress of Britain"

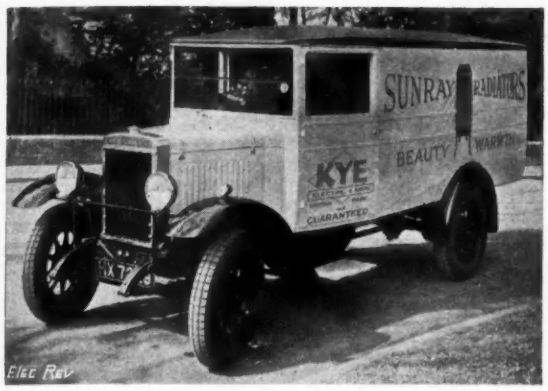
We have been asked to state that among the electrical equipment of the *Empress of Britain*, which was referred to in our May 29th issue, Messrs. Wm. McGeoch & Co., Ltd., supplied through Messrs. Hampton & Sons, furnishers, the electric lighting fittings for the tourist lounge, smoking room, dining saloon, tennis court café, lifts, and the first-class entrances. Over 80 per cent. of the total value of the cables installed in the ship was supplied by W. T. Henley's Telegraph Works Co., Ltd.

Congress of the Institute of Transport

In view of the opening of the 14-day Congress of the Institute of Transport in Italy last Saturday, *Modern Transport* has included in its issue of May 20th a 36-page supplement dealing with railway and transport developments in Italy. This includes a review of the rapid progress made in railway electrification during recent years.

An Attractive New Van

A handsome new van has just been put into service by the BRITISH ELECTRIC TRANSFORMER CO., LTD. The colour scheme is royal blue, deep orange and black on a buff background. On one side " Kye " lamps are advertised and on the other attention is called to " Sunray " radiators. The radiator seen in our illustration of the van is carried out in copper leaf—an unusual medium for this class of work.



A New " Tricity " Van

Industry and Credit

At a gathering of members of associations connected with the building, electrical and allied trades (including the local branch of the Electrical Contractors' Association) at Newcastle on Tuesday last an address was given by Mr. J. G. Jarvie, chairman of the United Dominions Trust, Ltd. Mr. Jarvie reviewed existing world conditions and stressed the importance of credit in modern industrial and commercial life. He advocated care in the granting of credit but deprecated undue restriction, stating that the experience of his company was that the loss ratio in any one year had never exceeded one-tenth of one per cent. Last year the Trust financed transactions representing merchandise to a value exceeding £5,000,000.

Government Contracts in Ecuador and Honduras

Copies of memoranda on the general conditions governing tenders for Government contracts in Ecuador and Honduras, prepared by Consular officials, have been issued by the Department of Overseas Trade and issued to firms whose names are entered on its Special Register. British firms desirous of obtaining copies should apply to the Department at 35, Old Queen Street, London, S.W.1. Reference numbers C.X. 3539 and C.X. 3542, respectively, should be quoted.

The International Glow-lamp Cartel

As we have already reported, the International Glow Lamp Cartel, which was formed in 1925, has been prolonged until the year 1952. The extension of the cartel was decided upon at a recent meeting held in London, when all the members of the cartel are reported to have been present and to have unanimously decided on the prolongation, which is said to have been prompted by the expected expiration in 1932 of certain important patents. The new agreement regulates the volume of exports of each of the members, and covers prices and important patent questions. In Germany the leading patents are stated to be due to expire in 1934 and 1936. German prices were slightly reduced in the home market last November, and it is uncertain whether any further concessions will be made in this respect. In the case of Holland, the Philips Company is reported to have made a reduction of 20 per cent., but the prices in that country were about 50 per cent. above the level of those in Germany.

Sir Arthur Balfour on Australian Tariffs

On May 28th Sir Arthur Balfour, chairman of the British Council of the Australian Association of British Manufacturers, spoke from London by radio-telephone to Mr. W. C. Guthrie, president of the Association, in Sydney, and the Hon. J. A. Boyd, president of the Melbourne Chamber of Commerce, in Melbourne. In the course of the conversation, Sir Arthur said that while those in this country were very sympathetic and well understood the difficult times through which Australia was passing, they considered it absolutely imperative that there should be no longer delay in taking steps which the economic experts had outlined as, without this, full confidence with regard to finance in Australia could not be established. In addition, the present high tariffs, while they might accomplish the one purpose of reducing imports, were terribly impeding the flow of trade and creating an unnatural condition in Australia which would later on have to be liquidated; so that the sooner they were reduced the sooner would there be a return to normal trading and a real improvement in the exchange.

Electric Cooker Production in Switzerland

Quoting a recent French report on industrial conditions in Switzerland, *Reuter's Trade Service* says that even the electrical industry has been unable to resist the depression, and reports a falling-off in orders, which is a precursor of unemployment. There are, however, a few works constructing special appliances whose orders are increasing. This is true of electric ovens; in 1930 over 16,300 kitchens were electrically equipped in Switzerland, as compared with 15,600 in 1929. Last year electric cooking apparatus was installed in 40 per cent. of the new apartments, and at the end of the year over 156,000 electric stoves were being used in Switzerland.

The Portuguese Radio Market

A recent report to the Department of Overseas Trade by the Commercial Secretary at Lisbon deals with the position and prospects of British radio manufacturers in Portugal. All radio apparatus is imported, although there are two assembling firms which make up sets for sale as a national product. British manufacturers were early in the field, but since 1927, when the Philips and Telefunken Companies established agencies, they have met with severe competition. There are at present no " official " broadcasting stations in Portugal, but two in Lisbon and one in Oporto are under consideration by the Government. Few British receiving sets are sold, but half of the components imported come from this country. The report suggests that the types of set suitable for the market are all-mains models to cover a wide wavelength range and to be entirely self-contained. It is considered, however, that the component business is likely to prove more fruitful and remunerative. British products, generally, enjoy an excellent reputation. The market is an expanding one, but suitable prices, generous commissions, after-sales service, and regular advertising are essential. The Department has available a list of importers and likely agents in Lisbon and Oporto.

The Dutch East Indies Tariff

The duty upon radio-telegraph and telephone apparatus upon importation into the Netherlands East Indies has been raised from 6 per cent. to 12 per cent. *ad valorem*.

A " Revo " Display at Chester

The Chester Corporation Electricity Department has recently " staged " a display of " Revo " domestic electrical appliances, including cookers, wash-boilers, fires, &c. The showroom window is illustrated in the accompanying picture. During the period of the display the roomy kitchen section of the showrooms was used for the practical demonstration of the appliances shown in the window, and other " Revo " apparatus.

A " Revo " Display at Chester

New Showrooms

The URBAN ELECTRIC SUPPLY CO., LTD., has opened new showrooms and offices at Electric House, 5, High Street West, Glossop.

Wages in the Engineering Industry

At the annual conference of the Amalgamated Engineering Union at Blackpool last week a resolution was passed instructing the Executive that the membership could not agree to negotiations which had the object of lengthening the working week. Other resolutions were on the agenda relating to applications for wage increases, the reduction of hours, and the abolition of overtime, but they were not proceeded with, it being pointed out that the conference had already settled its policy on the employers' proposals. Future negotiations would be decided by the next step taken by the employers.

It was announced at the beginning of this week that the discussions between the representatives of the employers and the trade unions were to be resumed yesterday (Thursday).

Telephone Manufacturing in Poland

In order that Poland may become independent of other countries for the supply of its automatic telephone instruments and apparatus, the Government is planning to install a special plant, and for this purpose is stated to have been granted a loan of £550,000, of which £300,000 will be supplied in the form of goods. The loan is believed to have been granted by a British firm, but no confirmation is obtainable, either from the office of the Commercial Attaché nor from the postal authorities. According to the plan, the Government works for the manufacture of telegraph and telephone apparatus will begin supplying the needs of the Ministry of Posts and Telegraphs in 1933 at the rate of 3,000 automatic telephones a year.—*Reuter* (Warsaw).

Bankruptcy Proceedings

A. PARSONS, electrician, 23, Clifton Crescent South, Rotherham, Yorks.—The first meeting of creditors was held on May 28th, at the Official Receiver's offices, Figtree Lane, Sheffield. The debtor attributed his failure to trade depression and expenses in excess of gross profits. The statement of affairs showed a deficiency of £200, on liabilities of £220. The case, being a summary one, was left in the hands of the Official Receiver as trustee.

H. COWEN & S. COWEN (Imperial Radio Manufacturing Co.), 43a, Barbican, E.C.—Trustee, Mr. E. H. Hawkins, 4, Charterhouse Square, E.C.1, appointed May 26th.

E. DOUDNEY, wireless wholesale and retail salesman, 93, East Street, Chichester.—Last day for receiving proofs for dividend, June 19th. Trustee, Mr. F. J. Gentle, 30, South Street, Chichester.

F. W. CASSELL (F. W. Cassell & Co.), electrician, 164, Park View Road, Welling.—Receiving order made May 20th, on debtor's own petition.

Company Liquidations

PERSEUS MANUFACTURING CO., LTD., manufacturers and factors of radio apparatus, Burton-on-Trent.—The statutory meeting of the creditors was held recently at the Houldsworth Hall, Deansgate, Manchester. The statement of affairs showed liabilities of £1,922 and net assets of £705, or a deficiency of £1,217. It was reported that the company was registered in July, 1924, with a nominal capital of £2,250. At the date of the liquidation the issued capital was £1,856, all of which was fully paid. It appeared that in 1925 the turnover was £6,565 with a net loss of £178. In the following twelve months the net loss was £617 and in the next accounting period there was a net profit of £62. In 1928 and 1929 the net profits were £180 and £204 respectively. It was estimated that since January 1st, 1930, there had been a net loss on the trading of £1,011, and the deficiency was attributed to that loss, together with the writing down of the assets in the statement of affairs. The creditors decided to confirm the voluntary liquidation of the company, with Mr. A. T. Eaves as liquidator, and a committee was also appointed.

ELM MANUFACTURING CO., LTD.—Winding up voluntarily. Liquidator: Mr. K. D. Hutton, 5, John Street, Bedford Row, W.C.

WIRELESS CONSULTANTS, LTD.—Meeting, June 29th, at Tudor House, Spon Street, Coventry, to receive an account of the winding up by the liquidator.

Winding-up Petition

SUN-RAY ELECTRIC LAMP CO., LTD.—A petition for the winding up of this company has been presented to the High Court by the Neglin Lamp Co., Ltd., and will be heard in London on June 8th.

Private Arrangement

HAROLD KNOX, trading as Harold's Radio Stores, 4, Daulby Street, Liverpool, wireless dealer.—A meeting of the creditors was held recently at the offices of Mr. H. C. Binns, 81, Dale Street, Liverpool. The statement of affairs showed liabilities of £507 and a deficiency of £229. The debtor's present position was attributed mainly to selling wireless sets on the hire-purchase system without the necessary capital. Practically the whole of the book debts were in respect of hire-purchase agreements. It was decided that the matter should be dealt with under a deed of assignment, with Mr. Binns as trustee, together with a committee. The latter has decided that the business shall be carried on for a period of three weeks, with a view to its sale as a going concern, failing the debtor's submitting a satisfactory offer.

Meeting of Creditors

MASON (ELECTRO-MEDICAL), LTD.—Creditors' meeting at Essex Hall, Essex Street, Strand, W.C., on June 5th.

Electricity Supply

Lighting, Domestic, Power

Aberdeen.—EXTENSIONS.—The Corporation Lighting Committee has agreed to light the Rosemount district, from Rosemount Viaduct to Belvidere Street, by electricity.

Argentina.—HYDRO-ELECTRIC DEVELOPMENT.—A decree was issued recently by the Argentine Ministry of Public Works, making financial provision for a survey of water-power possibilities in the provinces of San Luis, San Juan, Cordoba, Santiago del Estero, La Rioja, Catamarca, Tucuman, Jujuy, and the territory of Los Andes. It is the intention of the Government to provide the arid section of the country—a territory embracing parts of the provinces mentioned above—with hydro-electric power stations and irrigation works.

Australia.—POWER SCHEME INAUGURATED.—Sir J. Mitchell, the Prime Minister of Western Australia, recently inaugurated the new Collie power scheme which is to supply electricity in the south-western portion of the state. A sum of £1,500,000 has been spent on the project.

Barking.—LOAN SANCTIONED.—The Urban District Council Electricity Committee has received sanction to the borrowing of £5,794 for mains and services required for a section of the Becontree estate.

Barnard Castle.—OVERHEAD LINE SCHEME ABANDONED.—The Cleveland and Durham County Electric Power Co. has abandoned for the present the scheme for the erection of overhead lines in the Harmire district.

Bradford.—COLLECTION OF ACCOUNTS.—The Corporation has instructed the city treasurer to report as to the practicability and desirability of collecting accounts for electricity quarterly instead of half-yearly.

Brighouse.—YEAR'S WORKING.—Despite a large increase in charges for interest, income tax, and sinking fund, the past year's working of the Corporation Electricity Department shows a profit of £1,510.

Brighton.—IMPROVEMENT OF SUPPLY.—The Corporation Electricity Committee is to improve the electricity supply to Bevendean and the Whitehawk housing estate at a cost of £14,000.

GRIT COLLECTION.—The grit collecting system on two large Yarrow boilers at the power station is to be improved at a cost of £1,500 per unit.

Bury.—YEAR'S WORKING.—The net profit of the Corporation Electricity Department for the past year amounted to £1,758, a decline of £3,333 as compared with the preceding year.

Canada.—HYDRO-ELECTRIC DEVELOPMENT.—It is estimated by the Dominion Water Power & Hydrometric Bureau, Department of the Interior, that $80,000,000 was spent for labour, material and equipment during 1930 for the water power developments under construction in Canada, and that a further similar expenditure of $300,000,000 will be made during the next two or three years.

ONTARIO GOVERNMENT'S LOAN.—A loan of $30,000,000 required for hydro-electric and highway schemes is being issued by the Government of Ontario.

THE WEST KOOTENAY COMPANY'S NEW SCHEME.—A scheme for the development of 30,000 h.p. for the construction of a new power station on the Kootenay River, opposite Brilliant, is announced by the West Kootenay Power and Light Company.

Carlisle.—MAINS EXTENSIONS.—The Corporation Electricity Committee is to extend mains at a cost of £2,090.

Cheltenham.—CABLES AND METERS.—The Corporation Electricity Committee is to invite tenders for the supply of cables and meters for twelve months.

Cirencester.—ASSISTED WIRING.—The Rural District Council has consented to the Wessex Electricity Supply Co. installing electric lighting in Council houses under a scheme of assisted wiring, provided that a two-part tariff is adopted.

Clowne.—SUPPLY TO COUNCIL HOUSES.—The Rural District Council has granted permission to the Shireoaks Colliery Co. to supply electricity to Council houses at Whitwell, upon the expiration of the agreement with the Gas Company. It is the intention of the Shireoaks Co. to supply Whitwell, Bakestone Moor, and Hodthorpe with electricity.

Continental.—FRANCE.—The Compagnie d'Electricité Industrielle, of Paris, has recently secured a concession to establish a hydro-electric station to utilise the water power of the Portillon falls on the River Neste-d'Oo, near Cazeaux, in the Department of Haute Garonne.

ITALY.—The Italian Government has recently approved a project of the Società Italiana per l'Utilizzazione delle Forze Idrauliche del Veneto, of Udine, to establish a 135,000-V transmission line between Caneva and Marghera. The Società Elettrica Alto Adige of Novara has also been authorised to proceed with the erection of a 60,000-V line between Battiggio and Domodossola.

LUXEMBURG.—During the past year the Compagnie Luxembourgeoise d'Electricité extended its power supply service to twenty-one additional communes in its area and added about 40 miles of distribution mains to its system, which will enable it to provide a supply of power to forty-eight additional communes.

Coventry.—LOAN.—The Corporation Electricity Committee is to apply for sanction to a loan of £9,833 for mains and switchgear.

Epsom.—ELECTRIC HEATING OF NEW MUNICIPAL BUILDINGS.—The Urban District Council has decided to have the new municipal buildings heated by electricity. Four alternative methods of electric heating have been submitted to the Municipal Buildings Committee by the architects, Messrs. W. A. Pite and H. M. Fairweather.

Exeter.—YEAR'S WORKING.—The Corporation electricity undertaking showed a profit of £7,842 for the past year. A sum of £5,000 out of revenue was devoted to capital expenditure.

Finchley.—LOANS SANCTIONED.—The Urban District Council Electricity Committee has received sanction to the borrowing of £639 for buildings, £14,277 for mains and £12,881 for plant.

MAINS EXTENSIONS.—Mains extensions costing £564 are recommended by the Electricity Committee.

Glasgow.—MAINS EXTENSIONS.—The Corporation Electricity Committee recommends the laying of distributing mains at an estimated cost of £17,381.

PROGRESS DURING APRIL.—Under the Corporation Electricity Department's scheme, 802 houses were wired in April, making the total to date 31,683, while 15 hired appliances were installed, bringing the total to 20,954.

IMPROVED LIGHTING FOR LIBRARIES.—The city engineer has been authorised to obtain offers for the improvement of the electric lighting in two of the city libraries.

HOSPITAL IMPROVEMENTS.—The Corporation Health Committee recommends the installation of new electric cooking and ventilating apparatus at Gartloch Mental Hospital at an estimated cost of £1,288.

Gloucester.—LOAN SANCTIONED.—The City Council has received sanction to a loan of £2,000 for electric cookers.

Grays.—CHANGE-OVER.—The Urban District Council has approved an expenditure of £2,700 for the purpose of changing over the High Street electricity supply from d.c. to a.c.

Hailsham.—APPLICATION TO ELECTRICITY COMMISSIONERS.—The Rural District Council has decided to request the Electricity Commissioners to revoke the Special Order of the Weald Electricity Supply Co., Ltd., on the ground that the company has made default in laying distribution mains, and to inform the Commissioners that the Eastbourne Corporation is prepared, if sanction is given, to provide a supply of electricity in the area on terms more favourable than those of the Weald Co.

Halifax.—SUSPENSION OF PUBLIC LIGHTING.—The Corporation has decided to discontinue street lighting until July 25th, thereby effecting a saving of £1,208. The Electricity Committee's revenue will be reduced by £75, and its employés affected will lose £54 in wages.

Hull.—SCHOOL LIGHTING.—The Education Committee has decided to make provision in its estimates for the provision of electric lighting in place of gas at five more elementary schools.

Irish Free State.—THE SHANNON SCHEME.—Preliminary steps are to be taken this year by the Department of Industry and Commerce for the development of the second stage of the Shannon Scheme, says the *Irish Independent*. By the end of the current year, or certainly next year, it is calculated that the consumption of electricity in the Free State will be over 150,000,000 kWh per annum. This would be almost one-third more than the estimate of the experts who examined in detail the original scheme before it was approved by the Government and the Legislature. The scheme to be undertaken is officially referred to as "the second stage of the partial development." It involves the further embankment of Lough Derg and the keeping of the water of the lake at a high level during the summer months. It may also mean the installation of an additional turbine at Ardnacrusha. Opinion in official circles appears to favour the development of the Liffey before the final stage of the Shannon Scheme is undertaken.

Kilmarnock.—CLOSING OF ELECTRICITY WORKS.—It was announced at the annual meeting of the Ayrshire Electricity Board held last week that, as the Central Electricity Board was prepared to give a bulk supply of electricity, it had been decided to close down the Kilmarnock generating station between June 1st and September 30th.

Kingston-on-Thames.—YEAR'S WORKING.—The Corporation electricity undertaking showed a net profit of £10,618 for the year ended March 31st last. In the previous year the profit was only £4,853. Electricity sold during the year increased by over two million kWh to 10,514,781 kWh, and 410 new services were laid.

Manchester. — SWITCHGEAR. — The Corporation Electricity Committee is to provided 33,000-V switchgear at transformer stations and Barton power station at a cost of £45,900.

YEAR'S WORKING.—The annual report of the Corporation Electricity Committee shows a total income of £1,762,184, the surplus after meeting all expenditure amounting to £16,672, as compared with £46,044 in the previous year. The sales of electricity amounted to 377.7 million kWh, a decrease of 15.25 million kWh, as compared with the preceding year. The principal decrease was in bulk supplies to neighbouring undertakings, which showed a fall of 9 million kWh. In the Manchester area the decrease was only 1.95 per cent., and was almost entirely confined to supplies to basic industries. On the other hand, small industrial users increased their consumption by 5 million kWh, while commercial, institutional, and domestic sales showed an increase of 7 million kWh. Mainly as a consequence of the new business obtained in these sections, the total revenue from sales of electricity showed a net increase of £6,642. The number of consumers connected increased during the year by 5,657. During the year 6,600-V feeders, having an aggregate length of just over 11 miles, were laid for the interconnection of sub-stations, and the a.c. low-pressure system was extended by the addition of nearly 103 miles of cable. The change-over, which is actively proceeding, was carried out in the case of 4,198 consumers in the last twelve months, bringing the total number dealt with to 14,601. The net addition to mains amounted to almost 100 miles, and the total is now approximately 1,148 miles. At the end of the year 7,486 hired cookers were in service. The rate of issuing new cookers has been accelerated in recent months, the net increase for the year being 1,372.

Merthyr Tydfil.—GENERATING PLANT FOR HOSPITAL.—The governors of the General Hospital have decided to install their own generating plant for lighting and power instead of continuing to take a bulk supply from the Merthyr Electric Traction and Lighting Co., Ltd. The estimated cost of the installation will be about £2,600, and the engineer estimates an annual saving of over £200.

Newcastle-upon-Tyne.—POSTPONEMENT OF PURCHASE OPTION.—The Ministry of Transport has consented to the agreement between the Newcastle-upon-Tyne Electric Supply Co., Ltd., and the Newcastle Corporation relating to the postponement of the Corporation's option to purchase the right to supply electricity. The Ministry has promised to contribute £20,000 towards the cost of the change-over to be undertaken by the company in the event of the Corporation becoming residuary legatee of the undertaking.

Northern Ireland.—ELECTRICITY SUPPLY APPROPRIATION BILL.—During the past week the Northern Ireland Electricity Supply Appropriation Bill reached the Statute Book. It was amongst a number of Bills passed in the Northern Ireland Parliament during the session, and last week the Royal Assent to the Bills was received.

Norwich.—SUPPLY TO SEWAGE FARM.—The Town Council has approved a scheme for the provision of electricity for lighting and power at the Whitlingham sewage farm.

Plymouth.—YEAR'S WORKING.—The municipal electricity undertaking made a gross profit on last year's working of £95,335, and, after paying interest and sinking fund charges, there was a net surplus of £26,897.

CABLE EXTENSIONS.—Extensions of cable in twenty-two streets of the city, at a cost of over £3,000, were authorised at a recent meeting of the Corporation Electricity Committee.

Preston.—LOAN SANCTIONED.—The Corporation has received sanction to the borrowing of £11,205 for plant required for the transmission of electricity to Blackpool.

POWER STATION FUMES.—Following complaints of fumes from the Ribble power station, the Electricity Committee is seeking the advice of an expert on the matter.

Rothbury (Northumberland).—OVERHEAD LINES.—The Newcastle-upon-Tyne Electric Supply Co., Ltd., intends to erect a 20,000-V overhead line to Wards Hill Quarry. The Urban District Council has agreed to the proposal.

Rhodesia. — ELECTRICAL DEVELOPMENT AT NDOLA. — The Governor of Northern Rhodesia, Sir James Maxwell, has sanctioned an electricity undertaking at Ndola, "the capital of the copper belt" and the largest town in Northern Rhodesia. Mr. C. N. O. Dutton is the consulting engineer. Automatic telephone exchanges are also expected to be in operation this month.

Southend-on-Sea.—DOMESTIC ELECTRIFICATION.—The Town Council has decided to adopt schemes of assisted wiring and the hire-purchase of electrical apparatus. All materials used are to be of British manufacture and installations are to be carried out by registered contractors or by the Corporation. Under the hire-purchase scheme the list price of the apparatus, plus 6 per cent. per annum, is to be repaid by an initial instalment of 20 per cent., the balance being spread over a period not exceeding seven years. The hirer is to have the option at any time of becoming owner on payment of the outstanding instalments less the above 6 per cent. on such instalments. When a contractor effects the sale of a cooker, washboiler or water-heater, and the appliance is to be provided by the Corporation and paid for under the hire-purchase scheme, the discount usually allowed to the trade is to be divided equally between the Corporation and the contractor.

MOTOR-CAR CUTS OFF SUPPLY.—The electricity supply in a large area of the town was cut off last Sunday evening by a motor-car crashing into a pillar.

Special Orders.—Application has been made to the Electricity Commissioners by the Lancashire Electric Power Co. for a Special Order authorising it to supply electricity in the urban district of Haydock and the town of Rixton-with-Glazebrook in the Warrington rural district.

The Electricity Commissioners have submitted to the Minister of Transport for confirmation Special Orders made by them authorising (*a*) Norwich Corporation to supply electricity in the parishes of Brundall, Blofield and Witton, and part of the parish of Great Plumstead; and (*b*) the East Cornwall Electricity Supply Co., Ltd, to supply electricity in the boroughs of Bodmin and Lostwithiel, the urban district of

Looe, and the rural districts of Bodmin, Calstock, Camelford, Liskeard, and parts of the rural districts of Saint Austell and Launceston.

Startforth (Yorks.).—EXTENSION OF SUPPLY AREA.—The Parish Council has decided to extend the area of the supply of electricity in the village at a cost of £3,000.

Stoke-on-Trent.—SUPPLY TO HOUSING ESTATE.—Subject to an undertaking being given by the Wolstanton Council, the Corporation Electricity Committee is to make arrangements for a supply to be given to the houses proposed to be erected on the Little Dimsdale estate. A minimum charge of 1s. 2d. per house per week is to be made for the lighting supply, the amount being collected with the rent by the Wolstanton authorities. Energy consumed in excess of a certain amount per week is to be charged to the consumer concerned.

LOAN.—The Electricity Committee is applying for sanction to a loan of £1,100 for mains and services in connection with a proposed supply of electricity to 76 houses to be erected on the Meir estate.

United States.—HYDRO-ELECTRIC DEVELOPMENT IN SOUTH CAROLINA.—An artificial lake, 41 miles long and in some places 14 miles wide, has recently been created in South Carolina by a subsidiary of the General Gas & Electric Corporation, for the production of hydro-electric power. The scheme, which involved building what is said to be the largest earth dam in the world for power purposes, places South Carolina fifth amongst the North American States in the utilisation of water power. The new dam, built across the Saluda River, near Columbia, is 1¼ miles long and 208 ft. high. It creates a water-head of sufficient force to produce 360,000,000 kWh of electricity a year. To make way for the vast artificial lake created by it, a population of 5,000 persons was removed, and three churches and six schools were demolished. The power station is equipped with four generators having a combined capacity of 222,600 h.p., which is ultimately to be increased to 335,000 h.p. It has been erected to meet the growing demands of industry in the Southern States.

Traction

Blackburn.—YEAR'S WORKING.—The Corporation tramways last year showed a profit of £3,938, despite competition of omnibuses. The Tramways Department contributed £8,000 towards the relief of the rates and £6,000 for permanent way renewals.

Bolton.—THE BROWNLOW FOLD ROUTE.—The Corporation Tramways Committee has decided not to repair the tramway track of the Brownlow Fold route. It was reported that the debt outstanding on this section was about £19,000, and £11,000 had been set aside for depreciation and renewals. The effect of the decision is that when the track becomes too old to be used it will be closed, and, presumably, replaced by a 'bus service.

Continental.—BELGIUM.—Speaking at the annual meeting of the Belgian State Railway Exploitation Co. held in Brussels recently, the president, in reply to a question as to the electrification of the railways, stated that a special commission had been set up to consider the conversion of certain sections of the system. Reports on the electrification of the lines between Brussels and Luxemburg and between Brussels and Antwerp had already been prepared, which showed that the cost would amount to between £4,000,000 and £5,700,000. The Board had decided that under existing circumstances, there was no prospect of a sufficient increase in traffic to meet the interest on such an outlay nor to cover the operating expenses. Electrification work would only be proceeded with when it was shown to be in the interests of the country.

SPAIN.—A new electric railway has recently been completed and opened for traffic between Ribas, in the Spanish Pyrenees, and El Santuario du Nuria. The line, which is partially adhesion and partially rack, is about 8 miles in length, there being a rise of 3,600 ft. between the lower and upper terminal stations. The line is operated on the 1,500-V d.c. system, the electric locomotives being of 320 h.p.

FRANCE.—A new section of the underground electric railway in Paris has recently been completed and opened for traffic. The line extends from Richelieu-Drouot to the Porte de Charenton with fifteen intermediate stations.

RUSSIA.—Dealing with the question of the reconstruction of the system of railway transport in Soviet Russia, which is characterised as the most important national economic problem, the Moscow *Economic Life* recalls the fact that the State Electrical Commission in 1922 put forward a scheme for the electrification of 3,929 km. of track. Although the extension of electricity supply is ahead of the programme fixed by the Commission, the position with regard to the railways is said to be unsatisfactory. Thus, instead of the length of line mentioned, only 80 km. has so far been converted to electric traction. It is urged that the electrification of the railways must be carried out wholly in connection with the extension of the supply of electricity throughout the country.

Liverpool.—PROPOSED TUBE RAILWAY.—A scheme costing £6,000,000 for the linking up of the city's railway stations by a Tube system was considered at a recent meeting of the Unemployment Sub-committee of the Corporation Finance Committee. In a letter from Mr. C. Hamilton-Swanzy, of the Industrial Transport Association, it was stated that the proposed Tube system would operate from Lime Street Station, passing down under William Brown Street, crossing to Exchange Station, under Oldhall Street and King Edward Street to the Pier Head; under Mann Island, running between the Mersey Railway and the new traffic tunnel, then parallel with the former under Lord Street and Church Street to Ranelagh Street (with a subway to Central Station), and then continuing to the starting point at Lime Street. The city engineer mentioned that, owing to the fact that the underlying strata was red sandstone, the cost of the scheme would be considerably greater than if excavations had to be made in clay. The matter was referred to the city engineer for a report.

London.—VENTILATION OF TUBES.—Extensions of the tube railways and the increased number of train services are necessitating improvements in the system of underground ventilation. A scheme is now being carried out at an estimated cost of £100,000. *The Times* states that it has been decided to introduce a new system of ventilation on the Tube extension to Cockfosters now in course of construction. Of the 7½ miles of this new section 4½ miles will be underground, and, in addition to ventilating plants at the stations, it is intended to construct between the stations shafts through which fresh air will be delivered directly to the tunnels. The scheme which has now been undertaken does not provide for this experiment to be made over the whole of the London Tube system. At existing stations ventilating plants are, however, being extended, and the work of reconstruction already carried out has, it is stated, produced satisfactory results. At the beginning of 1929 air was forced into the tubes at the rate of 1,250,000 cu. ft. a minute. The ventilating plants now planned will, it is stated, increase that total to over 3,000,000 cu. ft. a minute. It is intended that these plants shall be installed within the next two years, and beyond this, immediate programme provision is to be made for developments that may be necessitated by increasing traffic. It has been found that ventilation has been considerably improved by the large escalator shafts that have been constructed at a number of stations, and that the ducts which are now being fitted to the ends of the railway cars provide a flow of air through the vehicles.

Rhondda.—PROPOSED TRAMWAY ABANDONMENT.—The Urban District Council is considering the question of scrapping its tramway system and substituting 'buses.

South Africa.—ELECTRIC SIGNALLING AT JOHANNESBURG.—The entire signalling system at the Johannesburg station of the South African Government Railways has just been converted from mechanical to electrical working on the coloured-light system. It is now controlled from one cabin instead of two as hitherto. Completely new apparatus was installed, consisting of 41 signals, 29 shunt signals, and fittings for 73 sets of points. About 70 miles of cable were laid and 909 electric lamps installed. Johannesburg is the second centre on the Union Railways to have this signalling system installed, the other being the Cape Town suburban line, which was equipped in 1929 and is working very satisfactorily.

Telegraph and Telephone

Argentina.—TELEPHONE CONCESSION.—A municipal concession has been granted to the United River Plate Telephone Company for the construction of local plant at Rafaela (population 11,250), an important town served by three railways (Central Argentine, Central Córdoba, and Santa Fé) and the centre of a rich agricultural district. Fitted with the latest type of automatic office, the new installation will make it possible not only to communicate over recently completed toll lines to all subscribers of the local telephone company, but also to enjoy the fullest international connections.—*Reuter's Trade Service.*

France.—WIRELESS FOR THE POLICE.—Pylons are being erected on the roof of the Ministry of the Interior in the Place Beauvis, says *World-Radio*, and it is understood that they are to be used for enabling the police to communicate orders and information by wireless to various parts of France and abroad.

Germany.—RADIO MEDICAL SERVICE.—The German medical authorities have established a radio coastal station, "Elbe-Weser-Radio," through which any ship can obtain medical advice. Such calls for assistance are, Philips Lamps, Ltd., inform us, connected directly through the new station to the National Hospital at Cuxhaven.

Hull.—TELEPHONE PROFIT.—The municipal telephone service's gross profit for the past year was £35,960, the net profit being £8,322. The royalty to the Government amounted to £11,551.

Poland.—TELEPHONY LOAN.—The Polish Minister of Posts and Telegraphs is reported to have stated that his department has concluded a loan of 80,000,000 zloty with the Cable, Telephone and General Trust, Ltd., which is a financing trust of the Associated Telephone and Telegraph Company, for the extension of the long-distance telephone network in Poland. Part of the loan will be advanced in cash and part will be represented by the delivery of telephone material.

Radio Communication Congress.—COPENHAGEN MEETING.—The Congress of the International Consultative Committee on the Technique of Radio Communication and of the International Radio-Scientific Union opened at Copenhagen on May 27th. More than thirty countries are represented at the Congress, which will continue until June 8th. The sittings are not open to the public. The British delegation is headed by

Colonel A. G. Lee and the thirty United States representatives are headed by Mr. Wallace White, member of the House of Representatives.—*Reuter.*

South Africa.—TELEPHONY.—Amongst the items of expenditure in loan estimates for the current year are £585,000 for telegraphy and telephony and £5,500 for automatic telephone exchanges at Cape Town, Sea Point, and Woodstock.

A Bill has been introduced into the South African Parliament by the Minister of Posts and Telegraphs to take power to acquire the Durban telephone system, which is owned by the municipality. The Bill is being sent to a Select Committee, when the Durban Council will have an opportunity to give evidence.

Spain.—TELEGRAPH TOLLS.—The telegraph tolls between Spain and Tangier have been reduced by fifty per cent.—*Reuter* (Madrid).

Radio

Germany.—POWER INCREASE.—On May 31st the power of the German broadcasting station at Königswusterhausen was raised to 75 kW, comparing with the 35 kW of the former transmitter. On the same reckoning, Daventry (5XX) transmits 35 kW, the midland regional station 38 kW, and the London regional 70 kW.

Italy.—NEW STATION.—The new plant at Palermo has been completed and will be formally opened on June 7th. Experimental transmissions have been carried out on a wavelength of 453.2 m., an international common wave shared also by Bolzano.

Japan.—The Nippon Hoso Kyokai (broadcasting corporation) is a state concern, the Tokio, Osaka, and Nagoya undertakings having been handed over to the Government in 1925. The board of directors is re-elected every two years; there are seven service areas with headquarters at Tokio. On February 27th, 1931, Tokio (JOAK) had 344,113 listeners, Osaka (JOBK) 235,478, and Nagoya (JOCK) 83,000, apart from those of minor stations, says *World-Radio*. Each listener has to register at the Bureau of Communications, the fee being 2s. in addition to a monthly subscription of 2s., with a penalty of £100 and/or imprisonment. A crystal receiver costs about £1 and the cheapest loud-speaker set about £3.

New Zealand.—LICENCES.—The Dominion licence figures continue to grow, there being now a grand total of 63,293, and, with the increased revenue provided, the standard of service is being steadily improved.

"Pirate" Detection.—P.O. VANS.—Eight districts have recently been covered by Post Office "direction-finding" vans, which are equipped to locate unlicenced receiving sets, and the total increase in the number of licences issued during the operation periods, as compared with the corresponding periods of last year, have totalled approximately 22,000, says the *Morning Post*. The districts and their respective increases are: Belfast, 719; Glasgow, 1,553; Manchester, 3,800; Newcastle-on-Tyne, 3,361; Stoke-on-Trent, 1,081; Cardiff, 2,269; Liverpool, 5,442; Leeds and Bradford, 3,703.

Radio Exchanges.—BLYTH.—A sub-committee of the Town Council has been appointed to consider two applications submitted by radio firms to relay wireless programmes "on tap" to subscribers. One firm offers the Council £50 for every thousand subscribers connected and the other firm £250.

SUNDERLAND.—The Highways Committee has refused to grant permission to a company to instal wiring in the town on the ground that many overhead wires would be necessary.

Reception.—MOONLIGHT EFFECT.—Moonlight, like sunlight, interferes with successful reception, according to a report Dr. Harlan T. Stetson, of the Perkins Observatory, made to a joint meeting of the American Institute of Electrical Engineers and the New York Electrical Society. The strength of signals between Chicago and Boston for last few years has been analysed and found to be about 100 per cent. better when the moon was below the horizon, believed to be due to a negative electrical charge on the moon. According to *Science*, the unfavourable influence of the moon on the reception of radio waves of 4,000 kilocycles has also been independently established by Lieut. H. F. Breckel, of the U.S. Navy Department, in Cincinnati, without knowing of the Perkins Observatory experiments.

ARCTIC EFFECT.—Capt. Ahrenberg, the well-known aviator, reports that on several occasions when flying over inland ice in Greenland his wireless apparatus ceased to function when his aeroplane reached a point about 40 km (25 miles) from the ice border.—*Reuter* (Stockholm).

Wavelength.—CHANGE.—The B.B.C. announces that on May 31st the wave-length of the Aberdeen transmitter was changed from 301.5 metres (995 kc/s) to the national common wave-length of 288.5 metres (1,040 kc/s). Synchronising equipment has been installed in order that the Aberdeen station may provide good service when working on the common wave-length.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Ballinasloe.—June 8th. Committee of Management. Complete electrical installation at the Ballinasloe Mental Hospital. Specifications (deposit £3 3s.) from J. P. Turner & Son, consulting engineers, 44, Kildare Street, Dublin.

Belgium.—ANDERLECHT.—June 12th. Hôtel Communal. H.p. and l.p. armoured cables. Particulars (6 fr.) from Régie d'Electricité, 4, Rue Van Lint, Anderlecht.

Blairgowrie and Rattray (PERTHSHIRE).—June 15th. Town Council. Converting of public lighting from gas to electricity. Specifications (deposit £1 1s.) from Mr. J. E. MacEwan, 62, Robertson Street, Glasgow.

Bridlington.—June 10th. Corporation. Conversion of distribution system from d.c. to a.c. (May 22nd.)

Cheadle and Gatley.—June 9th. Electricity Department. 125-kVA transformer kiosk. (May 22nd.)

Coseley (STAFFS.).—June 15th. Education Committee. Installation of electric lighting in five schools. (May 22nd.)

East Ham.—June 22nd. Education Committee. Installation of electric lighting at Cornwell, High Street and Plashet Schools. (See this issue.)

Egypt.—CAIRO.—July 21st. Ministry of the Interior. Diesel-driven alternator, with accessories, for Mehalla El Kebir power station. (A.X. 10934.)*

August 1st. Ministry of Public Works. Pumping and filtering plant for Edfu power station. (G.X. 10450.)*

Glasgow.—June 8th. Corporation. Electric lighting installations for housing schemes. Specifications, &c., from the general manager, Electricity Department, 4, West Regent Street, Glasgow, C.2.

June 11th. Education Department. Electrical installation at Springfield Road Advanced Central School. Specification (deposit £1 1s.) from Education Offices, Bath Street.

Halifax.—June 20th. Housing Committee. Electrical work at Out Station House, Northowram. Particulars from Mr. A. C. Tipple, borough engineer, Crossley Street, Halifax (deposit £1 1s.).

Lancaster.—Electricity Department. Overhead line between Halton and Caton. (May 22nd.)

London.—CENTRAL ELECTRICITY BOARD.—June 22nd. Site works, foundation works, buildings and cable bridge at Stockport and Bolton for the North-West England and North Wales Electricity Scheme. (May 22nd.)

June 29th. 33,000-V transformers for North-West England and North Wales Electricity Scheme. (See this issue.)

HAMMERSMITH.—Borough Council. Wiring for heating, cooking and water-heating in flats on Southern housing estate. (May 22nd.)

LONDON COUNTY COUNCIL.—June 15th. Wiring and fittings in two ward blocks at the Eastern Hospital, Homerton Grove, E.9. (May 29th.)

June 17th. Cables in connection with the installation of new ventilating plant at Rotherhithe Tunnel. (May 29th.)

June 22nd. Static transformers with e.h.p. and l.p. switchgear at Greenwich power station. (May 29th.)

WANDSWORTH.—June 19th. Borough Council. Furniture and equipment, including hospital equipment and electric table lamps, at the Borough Maternity Home, Grove Road, Balham. (See this issue.)

Morecambe and Heysham.—Electricity Department. Overhead line between Heysham and the villages of Middleton and Overton; also pole transformers, switchgear and l.p. distribution system in these villages. (May 29th.)

New Zealand.—WELLINGTON.—August 27th. Government Railways. Underground telephone cable equipment between Wellington and Paekakariki. (A.X. 10932.)*

Nottingham.—June 9th. Electricity Department. General stores. (May 22nd.)

Ryton.—Urban District Council. Transmission lines from Ryton to Stella Haughs.

Siam.—July 31st. Post and Telegraph Department. Armoured underground telephone cables. (A. 10928.)*

South Africa.—JOHANNESBURG.—Railways and Harbours. June 29th. Two electrically-driven traversers and eight trailers. (G.X. 10416.)*

July 27th. Lighting units for the new Concourse Railway Station. (G.10452.)*

PORT ELIZABETH.—City Council. June 25th. Materials and construction work in connection with the circulating water scheme for power stations. (G.X. 10460).*

July 23rd. Automatically-controlled centrifugal pumps, &c., for Baakens Valley main sewerage scheme. (G.X. 10461.)*

Watford.—June 18th. Corporation. Electrical heating plant for swimming and slipper baths. (May 22nd.)

West Midlands.—June 10th. Joint Electricity Authority. Cable work for Ironbridge generating station. (May 22nd.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Armadale.—Town Council. Accepted:—
Electric lighting of new housing scheme.—R. J. McIntyre.

Barking.—Electricity Committee. Recommended:—
E.h.p. cable (£798).—Derby Cables, Ltd.
L.p. cable.—Ateliers de Constructions Electriques de Charleroi (£1,834); C. L. Scott, Ltd. (£1,778).

Cheltenham.—Electricity Committee. Recommended:—
Overhead line for Arle and Uckington (£1,042).—Johnson and Phillips, Ltd.
Switchgear (£1,485).—George Ellison, Ltd.

Chesterfield.—Town Council. Accepted:—
Feeder cable (£970).—Derby Cables, Ltd.

Dagenham.—Urban District Council. Accepted:—
Electrical installation at Chadwell Heath library.—Alpha Manufacturing and Electrical Co., Ltd.

Dundee.—Cleansing Committee. Accepted:—
Electrical work at new cleansing depôt.—Quirk & Co.

Eastbourne.—Electricity Committee. Recommended:—
Transformers, switchgear, &c, for supply to Hailsham (£1,140).—General Electric Co., Ltd.
Devonshire Park Committee. Accepted:—
Electric lighting work at Winter Garden (£383).—H. Beney and Son.

Glasgow.—Lighting Committee. Accepted:—
Electrical fittings and accessories.—Sloan Electrical Co., Ltd.; Cartwright & Sons; Power and Lighting Cables, Ltd.; W. McGeoch & Co., Ltd.; T. Land & Son; C.C.A. (Central Cable and Accessories), Ltd.; Paterson and Service; Falk, Stadelmann & Co., Ltd.
Health Committee. Accepted:—
Electrical fittings.—General Electric Co., Ltd.
Housing Committee. Accepted:—
Electrical installation for 16 houses.—Darroch & Espie.
Electrical fittings and cables.—Drake & Gorham Wholesale, Ltd.; J. H. Tucker & Co., Ltd.
Parks Committee. Accepted:—
Electrical installation at Camphill House and Museum (£169).—J. C. Hall.
Education Committee. Accepted:—
Electrical work at Cloberhill school (£312).—Walter Bennett, Ltd.

Gloucester.—City Council. Accepted:—
Installation of automatic traffic control signals (£627).—Revo Electric Co., Ltd.

Hull.—Town Planning Committee. Recommended:—
Electric lighting installation at Shell-Mex premises (£600).—C. F. Procter.
Electric lamp standards (£2,198).—Siemens-Schuckert (Gt. Britain), Ltd.
Telephones Committee. Recommended:—
150 auto table instruments (£409).—Automatic Telephone Manufacturing Co., Ltd.

Lamp Contracts.—The British Electric Transformer Co., Ltd., has received contracts from the Great Western Railway and the London County Council for all types of "Kye" gasfilled and vacuum lamps.

London.—POPLAR.—Electricity Committee. Recommended:—
Convertor equipment and switchgear at Tomlins Grove station (£5,701).—Bruce, Peebles & Co., Ltd.

Maidenhead.—Town Council. Accepted:—
Four 50-kVA transformers (£212).—Foster Engineering Co., Ltd.

Manchester.—Electricity Committee. Accepted:—
Steel flue ducts for boilers Nos. 8 and 9, Barton station.—Combustion Plant Co., Ltd.
33,000-V switchgear extensions and alterations to feeder equipments, Barton station.—British Thomson-Houston Co., Ltd.
33,000-V switchgear extensions, Stuart Street station.—A. Reyrolle & Co., Ltd.
33,000-V switchgear extensions, Dickinson Street station.—Ferguson, Pailin, Ltd.
Electrically-operated passenger lift.—Etchells, Congdon and Muir, Ltd.
Automatic telephone equipment.—Standard Telephones and Cables, Ltd.
Education Committee. Accepted:—
Electrical alterations at Southall Street municipal school.—W. H. Smith & Co.
Electrical alterations at Abbott Street municipal school.—A. Loudon.

Northern Ireland.—Ministry of Commerce. Accepted:—
Construction of a h.p. transmission line linking Lurgan with Portadown, Richhill, Armagh and Markethill.—H. M. Spiers & Co.

Pembrokeshire.—Assistance Committee. Accepted:—
Electric lighting at Haverfordwest institution (£101).—M. Ross.

Preston.—Electricity Committee. Recommended:—
Cable (£3,072).—W. T. Glover & Co., Ltd.

Smethwick.—Health Committee. Accepted:—
Installation of internal telephones at Uplands institution.—New System Private Telephones, Ltd.
Housing Committee. Accepted:—
Electric lighting installation at Council houses.—Etna Heating and Lighting Co., Ltd.
Watch Committee. Recommended:—
Automatic traffic signals (£345).—Chance Bros. & Co., Ltd.

South Africa.—BARBERTON.—Municipal Council. Accepted:—
Supply and construction of the pipe line and generating plant for the second section of the hydro-electric scheme (£6,700).—Siemens (South Africa), Ltd.

Forthcoming Events

Congress of the Institute of Transport.—May 30th-June 14th. Italy.
Electrical Association for Women.—June 3rd-5th. Glasgow. Second International Conference.
Association of Mining Electrical Engineers.—June 9th-13th. Annual Convention. Friday, June 12th. Royal Hotel, Cardiff. 6 p.m. Annual dinner.
Faraday Society.—Wednesday, June 10th. Chemical Society. Burlington House, Piccadilly, W. 8 p.m. Annual meeting. Wednesday, June 17th. Royal Institution, London. "Michael Faraday." Dr. R. L. Mond.
Incorporated Municipal Electrical Association.—June 15th-20th. Scarborough. Annual Convention.
International Conference on Large Electric High-tension Systems.—June 18th-27th. Paris, France.
Royal Society of Arts.—Wednesday, June 24th. Adelphi, W.C. 4 p.m. Annual general meeting.
Electrical Contractors' Association.—June 24th-26th. Eastbourne. Annual Convention.

Our Service Department

INQUIRIES must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of makers of the following:—

"SUN-GLOW" Signs.
"BIRUM" Vacuum Cleaners.
"MARVEL" Super Hair Dryer.

Legal

Automatic Telephone Patent Suit

IN the Chancery Division on Tuesday, Mr. Justice Bennett had before him a procedure summons by the Siemens & Halske A.G., in a pending action by that company against Standard Telephones and Cables, Ltd. The plaintiffs asked that the International Standard Electric Corporation and the International Telephone and Telegraph Corporation might be added as defendants in the action. This action relates to the alleged breach of an international agreement for the pooling of patents and technical information regarding automatic telephones. The plaintiffs also desired the writ to be amended to enable them to claim damages for wrongful interference with their rights under a letter-contract and for alleged conspiracy.

The defendants, represented by MR. EVERSHED, said that the agreement in question had been repudiated on the ground that the plaintiffs had broken faith with them, a view which had been accepted at an arbitration.

His Lordship dismissed the summons on the ground that it was not necessary to join the two companies as defendants to enable the Court to adjudicate upon the matter. He gave the plaintiffs leave to appeal.

Western Electric Patents Extended

IN the Chancery Division on Tuesday last, before Mr. Justice Luxmoore, MR. T. WATSON, K.C., applied on behalf of Standard Telephones and Cables, Ltd., for an extension of five letters patent in consequence of war losses. Counsel stated that the first patent was dated June, 1915, and had expired. The other four were dated July, August, November, and December, 1915, and thus had not yet expired. There was no opposition to the application.

All these patents, said Counsel, dealt with radio-telegraphy and telephony, and were granted to the Western Electric Co., Ltd., of Great Britain, as assignees of the inventors who were in the employment of the parent company in America. On September 29th, 1925, the Western Electric Co., of Great Britain, changed its name to Standard Telephones and Cables, Ltd. Counsel read two affidavits in support of the application.

The war losses arose from two factors, *viz.*, from the nature of the inventions, and from the fact that the company, during the whole period of the war, was engaged in munition work, and a great deal of reconstruction was necessary after the war. The inventions dealt with broadcasting, long-distance telephony, &c. The applicants were a controlled establishment in 1915 and were not de-controlled till November, 1919. Counsel added that certain licences had been granted under the patents.

MR. STAFFORD CROSSMAN, for the Comptroller-General of Patents, said the view of the Comptroller was that the extension should be for a period of 3½ years.

His Lordship granted an extension of 3½ years for each patent from the date of expiry.

Electrical & Radio Products, Ltd.

IN the Chancery Division on June 2nd, before Mr. Justice Luxmoore, MR. SYKES, for the plaintiffs in the debenture-holder's action of Gottlieb and others *v.* Electrical and Radio Products, Ltd., moved for the appointment of a receiver and manager of the defendant company.

Counsel said that Mr. Romer, who appeared for the company, consented to the appointment and was also prepared to treat the motion as the trial of the action with the usual judgment.

MR. ROMER said he was not in a position to resist the motion.

His Lordship said he would appoint a receiver and manager with liberty to act not later than November 1st. By consent there would be the usual judgment in a debenture-holder's action, with no declaration of charge.

Notes

Appointments Vacant

Lecturer on electrical installation work for the Borough Polytechnic, London.

Lady demonstrator for Eccles Electricity Department.

(See our advertisement pages to-day.)

Overhead Lines Association

In view of the fears from time to time expressed in the daily Press as to the effect of overhead lines on rural amenities, Mr. G. W. Molle (hon. secretary of the Overhead Lines Association) has sent the following letter to newspapers in all parts of the country :—

"In some of your recent issues references have been made to the subject of overhead electrification schemes.

"This Association includes representatives of over a hundred of the most important electricity supply undertakings in this country. It consists chiefly of men who *want* to extend supplies of electricity to country towns, villages, and farms, and who find that, for a number of reasons, this is one of the most difficult jobs to tackle in this country.

"In most other countries a supply of electricity has been for many years such a commonplace feature as to be unworthy of remark even in the remotest district. Why is this? First of all, in order to be able to supply rural districts at all, the utmost economy must be observed. Therefore the cost of electric lines must be kept as low as possible. It is only possible even to consider rural supplies if they are given by means of overhead lines, which cost about one-third as much as underground cables. *Therefore every person and every society agitating for underground cables in preference to overhead lines, whether in or out of town or village, is working directly in opposition to the extension of electricity supplies.*

"The high density of population in this country has led to the greatest complexity as regards the ownership of land. In most foreign countries it is possible for electric overhead lines to be run for scores of miles with only a very small acknowledgment in cash, annually, from the supply company to landowners. In this country *there is no obstacle so great, nor one responsible for so much delay, as the landowner who withholds his consent to the erection of poles and who tries to get inequitably high rental payments from supply companies.* Our high density of population demands a very high standard of safety in construction. This means that even overhead lines are twice as expensive as (in order to give cheap rural supplies) they should be.

"History is repeating itself. The introduction of railways, the introduction of overhead telegraphs, led to that opposition which always seems to arise in this country whenever any really big step forward in scientific development is announced. So it is with electricity supply. It is just here that the Press with its vast influence can help instead of hindering development.

"In the last few months I have read dozens of Press cuttings complaining *simultaneously* of the delay in extending rural supplies and of the disfigurement of the countryside, due to overhead lines. The two things cannot be co-existent: *either* cheap overhead construction must be used, with a minimum of opposition from those whom the lines are designed to serve, *or* there will be no supplies of electricity. This Association pleads for more co-operation and fewer complaints. Every man and woman who writes letters of complaint to the Press is helping to put the clock back and to keep this country's rural electrical development, as it undoubtedly is, a quarter of a century behind that of the rest of the world."

International Electrical Congress, Paris, 1932

This year is the 50th anniversary of the first International Electricity Congress, which took place in 1881. It was at that Congress that the principal decisions were taken regarding electrical units, without which the industry could not have progressed as it has. To sum up the work of half a century and submit it to a general survey, which may perhaps enable them to deduce general rules which will be useful for the future, the Comité Electrotechnique Française, la Société Française des Electriciens, la Société Française de Physique, l'Union des Syndicats de l'Electricité have decided to organise in Paris, under the auspices of the Commission Electrotechnique Internationals, an International Electrical Congress which is to be held in July, 1932. The address of the organising committee is 134, Bd. Haussmann, Paris, VIIIe.

Lighting at the Trocadero Restaurant

The Trocadero Restaurant, London, one of the most popular in the metropolis, has lately undergone a good deal of redecoration and refurnishing, incorporating illumination as an integral part, to the design and under the direction of Mr. Oliver P. Bernard. The General Electric Co., Ltd., was entrusted with the manufacture of most of the special decorative lighting equipment for the grill room, a large apartment of irregular shape with two distinct systems of illumination. In the old grill room is a series of suspended daylight-type ceiling fittings varying in length from eight to thirty feet, and consisting of internally-ribbed white and pink glass tubes secured together by fine silvered wire binding. Each is constructed of uniform sections 12 in. long, which are attached by two suspension hooks, and the magnitude of the work involved in their assembly may be gauged by the fact that not less than 45,000 glass tubes were used in the formation of these fittings, each tube being assembled as a separate component, wire bound and soldered in two position, a matter of 90,000 soldered joints. "Osram" lamps are spaced at 12 in. centres, coinciding that each 12-in. section of the fittings, and reflections on the glass tubes form a pattern of interlaced semi-circles. Three distinct types of lighting obtain in the grill room extension, namely, two luminous laylights suspended in coved recessed channels, each 88 ft. long. Large rectangular recessed illuminated cornices are built in the centre of the ceiling and over the bay at one end of the room, and handsome demi-coupe brackets of distinctive design are fixed in wall panels.

Explosion Risks in Manholes

Explosion hazards in manholes in cities can be materially reduced by extended surveys, reports the United States Bureau of Mines. Leakage of manufactured gas was found to be the chief source of combustion in the manholes tested in Boston in co-operation with the Edison Electric Illuminating Company as the result of several explosions in manholes, conduit, and other underground openings, which caused loss of property and inconvenience to users of light and power. The survey extended over a period of one year, during which time 1,765 different manholes were tested and 4,068 separate tests made. As a general average, 6 per cent. of the manholes tested contained combustible, or sewer, gas at one time or another; manholes in outlying districts were usually found to be free from gas. Carbon monoxide and hydrogen were present in all samples which contained combustible gases in amount equal to 25 per cent. of the lower explosive limit; in no case was petrol or other similar hydro-carbons detected. Sewer gas was found in nine samples; the amount of combustible gases was always so low in these as to present no explosion hazard, but on account of their low oxygen content such atmospheres would suffocate workmen who entered them without respiratory protection. The number of gassy manholes found during the different test periods declined steadily, which marked decrease in number as the survey progressed was largely due to the willing co-operation of those responsible for the presence of gas in the manholes. Simple portable testing apparatus was designed by the Bureau of Mines, and the results obtained showed that it would be well worth while for electricity and gas supply companies in other cities to conduct similar tests over an extended period and to promote similar joint action to that which is being carried out in the Boston district this year by the Edison Electric Illuminating Company and the Boston Consolidated Gas Company by a joint testing crew.

I.E.E. Golf Competition

The golf competition organised by the Mersey and North Wales (Liverpool) Centre of the Institution of Electrical Engineers in aid of the Benevolent Fund was played over the links of the West Lancashire Golf Club on May 20th. The total number of entries was 148. The weather was delightful, which made the day a very enjoyable one for members and their friends. Mr. A. J. Pratt, chairman, presided at the dinner which was held at the Club House, when the prizes were presented by Mr. P. J. Robinson. At the close of the proceedings a presentation was made to the hon. secretary, Mr. O. C. Waygood.

Transformers and Tap-changing

The testing transformer illustrated on p. 908 of our last issue is designed for 500 kV. The electrical works of Asea, in Sweden, are at Vesteras and Ludvika.

The Swan Memorial

As announced in the ELECTRICAL REVIEW of May 22nd, a bronze tablet in memory of the late Sir Joseph Wilson Swan, D.Sc., F.R.S., will be unveiled by the president of the Institution of Electrical Engineers to-day at Sunderland, where Sir Joseph was born in 1828. As Sir Joseph Swan spent most of his life in the city of Newcastle-on-Tyne, and as one of the first places (if not actually the first) where Swan incandescent electric lamps were commercially installed was in Coxon's drapery stores, Market Street, Newcastle, the Newcastle-upon-Tyne Electric Supply Co., Ltd., considered it appropriate that a similar tablet should be erected in that city, and this will be done at the company's head office, Carliol House, Newcastle-on-Tyne.

I.E.E. Council Nominations

The following officers have been nominated to fill the vacancies which will occur by retirement in September next :—President: Capt. J. M. Donaldson, M.C.; vice-presidents: Messrs. J. M. Kennedy and F. W. Purse; hon. treasurer: Mr. E. Leete; members of Council: Messrs. C. Le Maistre, H. A. Ratcliffe, R. H. Schofield, J. W. J. Townley, Dr. E. H. Rayner, Lieut.-Col. A. G. Lee, and the Viscount Falmouth.

Colliery Winders in Germany

What are claimed to be the two largest electric colliery winding engines in Germany are being constructed for the Zollverein pits of the United Steel Co.; they are each designed to raise 10 tons 4 cwt. from a depth of 820 yards at the rate of 410 tons per hour.

Electric Farming in Bedfordshire

Farmers in North Bedfordshire welcome the development of the rural electrification experiment of the Bedford Corporation, working in conjunction with the Electricity Commissioners. According to *The Times* most of the farms in the villages served have the lighting service, and many are completely "electrified." Milking plants, cream separators, incubators, and foster-mothers are among the equipment to which electricity has been readily adapted, while the more obvious uses in connection with cutting, threshing, grinding, and pulping machinery are widespread. On one general farm at Millbrook there is scarcely a single farming operation to which electrical power has not been adapted.

Another farmer, who rears poultry at Elstow, declares that electricity, as applied to poultry-farming, is more efficient than any other source of light, heat, or power. He finds the percentage of hatchings from his electrical incubators increased to 95 from a considerably lower figure, and there is no worry about keeping lamps alight. The electric foster-mother for the chicks gives wonderful results, and the warming of the poultry house by means of a special electric lamp has proved beneficial to the health of the birds. This farmer also uses power for grinding, and finds it a great time-saver. The work, it is stated, is almost completed in the time taken to start some farm engines of a less up-to-date pattern. In another village there is an electrical nursery, in which the water for the glasshouses is heated and kept hot by the use of electricity. All this development is normal to the scheme and on a commercial basis.

Passenger Trouble on an Indian Railway

An unusual example of technical curiosity on the part of a passenger—curiosity which nearly resulted in tragic consequences—is reported from the West Indian Peninsula Railway. It appears that the owner of an elephant had occasion to transport his charge from Poona to Bombay upon that railway, which has recently been electrified by British Insulated Cables of Prescot. Unfortunately the animal was loaded into an open truck, and his interest in, and admiration for, the Prescot overhead fittings, which were alive at 3,000 volts, proved too much for his discretion; his trunk wandered, investigating . . . and when he had sufficiently recovered he was taken out of the truck and proceeded to Bombay by the good old-fashioned method of walking the whole 111 miles.

Readers are warned that when next they transport elephants by electric railway they will be well advised to use a closed truck.

New Time Signal for London

The Mayor of Holborn, Councillor Percy Hill, recently inaugurated a new method of giving passers-by in Holborn the time at 1 o'clock (summer time) as flashed from the Greenwich observatory; 30 ft. above the pavement outside the offices of the British Waltham Watch Company, High Holborn, is a stainless steel mast with a golden globe at the top. At ten seconds to one o'clock an electric warning bell sounds and at one o'clock exactly the gilt ball drops and a flambeau lamp of 1,000 candle power lights. This official time recorder is automatically operated by the Standard Time Company which, by hourly signals *via* a G.P.O. line from Greenwich observatory, synchronises public clocks in the city, including those of the Corporation, the Bank of England, the Stock Exchange, and all the banks. Greenwich mean time takes no heed of summer time, so that when the Holborn ball falls it is really noon, though watches should be at one p.m. The mast now used is comparatively short, but a tall one is to be erected for public service in the west end of London and eventually the Waltham Watch Company will place similar signals in many British and American towns.

The Shannon Scheme and Agriculture

In an address at the Royal Dublin Society Mr. R. Borlase Matthews expressed the opinion that the River Shannon hydro-electric power scheme was one of the finest things that could have happened for the benefit of Irish agriculture. As the applications of electricity to agriculture in Ireland were only in their beginnings, the importance of starting by using the best and most suitable equipment was emphasised and the hope expressed that full advantage would be taken of what had already been done in Europe. Emphasis was laid on the importance of electrifying a number of farms in each district to be used for demonstration, and also on the important part which educational campaigns must play in the development of rural electrification. The lecture was illustrated with kinematograph films showing electrically-operated machinery in use on different farms.

Colliery Equipment

In the development of the Arthur & Edward Colliery of the Lydney & Crump Meadow Collieries Co., Ltd., a considerable amount of electrical apparatus has been installed, including outdoor transformer sub-station equipment, a truck cubicle switchboard on the surface, and pedestal oil-immersed switchboards, haulage-gear motors, motor-control gear, motor-driven turbine pumps, &c., below ground. The contract for this plant was placed with the General Electric Co., Ltd. The incoming power is taken from the 33,000-volt 50-cycle overhead lines of the West Gloucestershire Power Co. and transformed down to 3,300 volts. The pit-bottom switchboard is of the pedestal oil-immersed draw-out type, comprising 6 units. The electrically-driven equipment below ground includes two main haulages, each driven by 130-h.p., 3,300-volt, three-phase "Witton" induction motors. The control gear for each motor consists of three items: a main oil-immersed draw-out pillar, an oil immersed stator reversing contactor, and a horizontal oil-immersed drum-type controller. A feature of the contactor is that all three phases are broken when reversing, thus making the motor dead. The drum-type controller has special features of design. Thus, the drum section is fixed to end brackets on the lid, so that it is very accessible when the lid is open. Further, the lid can only be opened or closed when the operating handle is in the "off" position and the motor is completely isolated from the line, all three phases being broken by the controller.

Lighting of Lady Chapel, Hereford Cathedral

The installation of a new system of lighting has just been completed in the Lady Chapel, Hereford Cathedral. "Mirolux" stainless-steel troughs are employed and are concealed behind the ribs of the vaulting. The installation was planned throughout by the Edison Swan Electric Co., Ltd., which was

Hereford Cathedral Lighting

commissioned by Messrs. Nicholson & Clark, the diocesan architects. "Royal Ediswan" lamps were employed throughout, and the result is entirely adequate illumination at all points without hard shadows or visibility of lamps or fittings from normal points of view.

Electrification and Freight-train Brakes

Although the Report of the Weir Committee is based on existing traffic working conditions, if any such far-reaching scheme as the general electrification of the main-line railways in this country were decided upon it would, the *Railway Gazette* suggests, be a grave mistake not to exploit the change-over of traction to the fullest possible extent. The advantages of working freight traffic electrically arise, as was pointed out in Merz & McLellan's L. & N.E.R. scheme (Appendix IV of the Report), from the virtually unlimited locomotive power which can be provided without exceeding the restrictions of loading gauge and weight. Unfortunately, there are at present other restrictions which would prevent heavy goods trains from being hauled at increased speed, chief of which is the lack of continuous brakes. Contemporaneously with electrification, the fitting of all goods stock with such continuous brakes should be undertaken, so that full advantage could be obtained from electric traction for this class of traffic. Further, there are certain sections of railway on which it would seem that regenerative braking might with advantage and economy be adopted. Such considerations as these, which were not dealt with in the Report, should certainly not be ignored by the companies in considering it.

Preheating with Diphenyl Oxide

For several years engineers have speculated on the possible uses of diphenyl oxide in power plant practice, and, according to *Power*, much work of an experimental nature has been carried on. At first it was thought to be suitable in a binary cycle for steam generation, but better knowledge of its characteristics has led to the abandonment of this idea. It does, however, offer possibilities as a medium for heat storage and heat transfer, especially as its specific heat is 3.78 times that of water. Concerning the former, it has been suggested as a means of storing heat during off-peak periods to heat feed water during peak-load periods, thereby permitting the turbine bleeders to be closed. For the control of superheat and for reheating steam between high- and low-pressure turbines it has desirable features. These and several other uses are being investigated and the announcement of some early applications of this sort may be looked for.

Still another use is in air preheating where it permits independent control of primary and secondary air temperatures and eliminates considerable duct-work. The first installation of this kind to be announced is in the new Bremo Bluff station of the Virginia Public Service Company, U.S.A., which recently commenced service. If predictions are borne out by operating experience another advance will have been made in power practice.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Birthday Honours.—The Honours List published on the King's birthday (Wednesday last) contained seven names of interest to our readers. At the head of the list is **Sir William Bragg,** K.B.E., F.R.S., the distinguished scientist, who receives the Order of Merit, an honour which is well bestowed. We published Sir William's portrait in our issue of January 30th last upon his election as an honorary member of the I.E.E.

Mr. H. A. Sams, Indian Civil Service, Director-General of Posts and Telegraphs, is knighted. Mr. Leon Simon, Director of Telegraphs and Telephones, G.P.O., and Lt.-Col. A. H. Mount, Chief Inspecting Officer of Railways, Ministry of Transport, are awarded the C.B. (Civil Division). Mr. H. O. Chalkley, Commercial Counsellor at the Washington Embassy, receives the C.M.G.; until quite recently Mr. Chalkley was Commercial Counsellor at Buenos Aires, where he rendered signal service to British trade with Argentina. The C.M.G. is also conferred upon Mr. H. A. Mayne, Inspector-General of Telegraphs and Telephones, Egyptian Ministry of Communications. Dr. A. C. Norman, Director of the Baghdad X-Ray and Electrical Institute, receives the O.B.E.

Mr. H. Fildes, for many years with the Metropolitan-Vickers Electrical Co., Ltd., has joined the Hotpoint Electric Appliance Co., Ltd., at its Manchester office, 99, Corporation Street, as sales engineer for cookers, &c.

Mr. A. Avis, managing director of Overhead, Ltd., has resigned that position to take up an appointment with the Transmission Lines & Cables Construction Co., of Keighley, as outside chief constructional engineer.

The members of the London Electricity Supply Association (formerly known as the Conference of Chief Officials of the London Electric Supply Companies) entertained their chairman, **Mr. Frank Bailey,** M.Inst.C.E., at dinner at the Café Royal on May 28th. The whole of the companies were represented, and the chair was taken by Mr. R. G. Rawkins, J.P., F.C.I.S. As a mark of personal esteem and a practical appreciation of Mr. Bailey's services since the inception of the body in 1905, the chairman asked him to accept a silver tray, suitably inscribed and containing facsimile signatures of the members of the Association, together with a bound vellum booklet. The latter contained inscribed resolutions passed by the boards of all the London electricity supply companies and by the Association itself, placing on record their gratitude to Mr. Bailey for his labours in the general interests of the companies. Mr. Bailey has been associated with London's electricity supply since 1887, when, with the late Mr. J. E. H. Gordon, he formed the Whitehall Electricity Supply Co., which was later merged in the Metropolitan Company. He is now chief engineer and joint managing director of the City of London Electric Lighting Co., Ltd.

Mr. A. L. Keet has been confirmed in the position of city electrical engineer of Exeter at a salary of £900 per annum. In making the recommendation the Electricity Committee recalled that Mr. Keet was appointed at a salary of £700 per annum in March last year and the position was to be reviewed at the end of twelve months. During that period Mr. Keet had performed his duties to their complete satisfaction.

Elliott & Fry] *[London*

Mr. J. M. Kennedy, O.B.E.
Nominated vice-president of the I.E.E.

On page 999 of this issue we publish a brief account of the career of **Capt. J. M. Donaldson,** M.C., president-elect of the Institution of Electrical Engineers. There are two vacancies for vice-presidents, and for these Messrs. J. M. Kennedy, O.B.E., and F. W. Purse have been nominated. Their portraits accompany these notes.

Mr. J. M. Kennedy is a member of the well-known firm of consulting engineers, Messrs. Kennedy & Donkin. He was born in 1879, the son of Sir Alexander B. W. Kennedy, F.R.S. He was educated at University College School and at Cambridge, receiving his technical training with Richard Moreland & Sons, Willans & Robinson, Ltd., and Siemens and Halske, Berlin. He is a member of the Institution of Civil Engineers. His firm have been responsible for important electrical undertakings in many parts of the world. One of the latest is the scheme for supplying electricity in a large area of Northern Ireland. They are consultants to a number of leading electrical bodies such as the Central Electricity Board and several large supply undertakings.

Haines] *[London*

Mr. F. W. Purse
Nominated vice-president of the I.E.E.

The other nominee for the position of vice-president is **Mr. F. W. Purse,** a well-known figure in the electricity supply industry. He was a "municipal" man for many years before leaving West Ham, where he was borough electrical engineer, two years ago, to take up his present position of chief engineer to the London and Home Counties Joint Electricity Authority. His activities have extended into the many by-ways of electricity supply. He has been particularly interested in securing sound installation work. Not only has he been one of the leaders in the contractors' registration movement, he was also instrumental in having the I.E.E. Wiring Rules adopted as bye-laws in West Ham. Fuel, illumination, standardisation, and research have all claimed his attention, and he is a member of many associations and committees.

Col. R. E. Crompton still takes a lively interest in the affairs of the company which he established 43 years ago. In the accompanying picture he is seen at the recent joint sports meeting of the staffs of Crompton Parkinson, Ltd., Marconi's Wireless Telegraph Co., Ltd., and the Hoffmann Manufacturing Co., Ltd. With him are Mr. Pochin (right) and Mr. Johnson (Crompton Parkinson, Ltd.). Col. and Mrs. Crompton celebrate their diamond wedding to-morrow (Saturday).

Col. Crompton at a Sports Meeting

Mr. J. M. Doe, who has been on the staff of the Electric Construction Co., Ltd., for many years, has been appointed to represent the company in Glasgow in succession to Mr. W. L. Winning, whose death was reported in our last issue.

Messrs. P. H. Jackson and **H. R. Herring** are the directors of P. H. Jackson & Co., Ltd., Birmingham, whose registration was recorded in our issue of May 22nd.

Mr. F. Green, late of the Credenda Conduits Co., Ltd., has joined the Vitreous Enamelling Co., Ltd., Tyseley, Birmingham.

Mr. E. A. Marx has been appointed manager of the Leeds branch of Siemens Electric Lamps and Supplies, Ltd.

Obituary

Mr. W. C. Lambourn.—The death occurred in a Manchester nursing home recently of Mr. Walter C. Lambourn, A.M.I.E.E., assistant mains engineer to the Manchester Electricity Supply Department. Mr. Lambourn was with the Newcastle-upon-Tyne Electric Supply Co., Ltd., for about 26 years, ultimately becoming district mains engineer for the City of Newcastle.

Mr. P. Brown.—Mr. Percy Brown, vice-chairman and joint managing director of David Brown and Sons (Huddersfield), Ltd., died at his home, Edgerton, Huddersfield, on Monday last at the age of 53. He was the son of the late Mr. David Brown, who founded the company in 1850, and he had been associated with the business for practically the whole of his life. He played an important part in the development of gear design, and had an intimate knowledge of every detail of manufacture. He was a member of a number of associations connected with the metal-working industries, and was also a director of the Société Française des Procédés David Brown & Sons, a company recently formed to manufacture worm gearing in France. He leaves a widow and four daughters.

The Late Mr. Percy Brown

Mr. G. C. Law.—We regret to report the accidental death on May 28th of Mr. George Cheyne Law, deputy borough electrical engineer of the Metropolitan Borough of Hammersmith. A taxicab in which he was returning home skidded and crashed into a motor coach coming in the opposite direction, in Upper Richmond Road, S.W. Mr. Law started his career with the Poplar Electricity Department, and for many years held the position of chief assistant engineer in the Barnes U.D.C. Electricity Department. Eighteen months ago he was appointed deputy borough electrical engineer of Hammersmith. He was an associate member of the Institution of Electrical Engineers, a Fellow of the Royal Society of Arts, and a member of the Institution of Public Lighting Engineers.

We have received the following tribute to Mr. Law from the Town Clerk of Hammersmith:—"The late Mr. Law, who was appointed to his position rather less than two years ago, was recognised as an energetic officer of distinct technical and administrative ability, who threw himself with zest into the rapid development of the Council's electricity undertaking. He was held in high esteem by the members of the Council and by the staff and employés generally, and his loss to the Borough, more particularly in such tragic circumstances, is keenly felt."

The funeral took place on Wednesday last at the East Sheen Cemetery.

Mr. H. F. Wynn.—We regret to learn of the death of Mr. Horace F. Wynn, sales director of the Fuller Accumulator Co., Ltd., which occurred on May 20th as a result of pneumonia. Mr. Wynn, who was 46 years of age, commenced his electrical career as a pupil at Siemens's Stafford works, later joining the British Thomson-Houston Co., Ltd. He then went to Messrs. Herbert Morris, Ltd., Loughborough, for whom he acted as sales manager until 1919, when he took up a similar position with Fuller's United Electric Works, Ltd. He became sales director of the Fuller Accumulator Co., Ltd., upon its formation in 1926.

The death is announced from Milan, at the age of 61 years, of **Signor Alfredo Montel**, a leading Italian authority on wireless telegraphy.

Wills.—The late **Mr. Charles Patrick**, formerly Comptroller of Tramways, Light and Power in Rio de Janeiro, and secretary of the Birmingham Tramways Co., left estate valued at £12,082 gross (£11,953 net personalty).

The late **Mr. F. H. Nalder**, of Nalder Bros. & Thompson, Ltd., left £10,140 (£9,340 net personalty).

Mr. Robert Woodward, of Bournemouth, the late chairman of Messrs. Edgar Allen & Co., Ltd., Sheffield, left estate valued at £27,628 (net personalty £23,571).

Estate valued at £4,200 (net personalty *nil*) was left by the late **Mr. Oswald Falconar**, joint managing director of Falconar, Cross & Co., Ltd., Newcastle-upon-Tyne.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Pollard & Smith, Ltd.—Private company. Registered May 30th. Capital, £2,000 in £1 shares. Objects: To acquire the business of electrical and radio wholesalers carried on by H. H. Pollard and W. H. Smith, at 78, King Street, Manchester. The directors are: H. H. Pollard, 3, Park Road, West Timperley, near Altrincham, Cheshire (electrical engineer), and W. H. Smith, 153, Gatley Road, Gatley, Cheshire (electrical engineer).

Hurley Machine Co. (England), Ltd.—Private company. Registered May 30th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in all kinds of vacuum, suction, cleaning and refrigerating machines, sweepers, washing, ironing and other laundry machines and all mechanical labour saving devices, mechanical, electrical and general engineers, &c. The subscribers are: M. A. Hussey, 6, Russell Gardens, N.W.11 (engineer), and W. Angus, 12, Blomvill Road, Chadwell Heath, Essex (clerk). The first directors are not named. Solicitors: Cohen & Cohen, 112, Salisbury House, E.C.2.

Pettie & Co. (Electrical Engineers), Ltd.—Private company. Registered May 29th. Capital, £1,000 in £1 shares. Objects: To carry on the business of electrical, mechanical and automobile engineers, &c. The permanent directors are: A. N. Greenall (chairman), Alexandra Mount, Woodborough Road, Nottingham, and A. J. S. Pettie, 5, Devonshire Road, W. Bridgford, Notts. Registered office: 34, Castle Gate, Nottingham.

C. A. V. Batteries, Ltd.—Private company. Registered May 30th. Nominal capital of £5,000 in £1 shares. Objects: To carry on the business of electrical engineers and contractors, suppliers of electricity, carriers of passengers and goods, manufacturers of and dealers in electrical equipment, apparatus and accessories for motor vehicles, stationary engines, omnibuses, road and railway motor coaches, aircraft and tractors, manufacturers of and dealers in apparatus used for wireless, telegraphic or telephonic signals, battery eliminators, loud speakers, gramophones, &c. The subscribers are: G. H. Cockin, "Highgate," Haden Hill, Old Hill, Staffs. (solicitors), and W. B. Bagnall, 129, Jeffcock Road, Wolverhampton (solicitor). The first directors are to be appointed by the subscribers. Solicitors: Eversheds & Tomkinson, 25, Temple Row, Birmingham.

Transatlantic Radio, Ltd.—Private company. Registered May 29th. Capital, £100 in £1 shares. Objects: To carry on the business of electrical, wireless, television, mechanical and general engineers, &c. The directors are: Mrs. R. H. Wilson, 38, Spencer Place, Leeds; S. Morris, 15, Fountayne Road, Stoke Newington, N.16. Solicitors: Joseph Wurzal & Co., 68, Albion Street, Leeds.

Sound Reproducer Service Co., Ltd.—Private company. Registered May 26th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in all apparatus incidental to the synchronising of mechanical music to cinematograph pictures, &c. The directors are: E. Ramsey, electrical engineer, and Gladys Ramsey, 1, Springfield Place, Hunslet Carr, Leeds. Registered office: 23, Park Row, Leeds.

Majestic Distributors (Midlands), Ltd.—Private company. Registered May 27th. Capital, £100 in £1 shares. Objects: To adopt agreements with the Majestic Electric Co., Ltd., for the acquisition of the sole agency rights in certain territories for the sale of "Majestic" radio sets and other "Majestic" products manufactured by the Grigsley-Grunow Company, of Chicago, and to carry on the business of manufacturers of and dealers in wireless, telegraph and telephone instruments, television sets, refrigerators, &c. The subscribers are: C. H. Rosenthal, 12, Rotton Park Road, Edgbaston, and J. Harris, 30, Wheeleys Road, Edgbaston, wireless manufacturers. C. H. Rosenthal signs documents as director. Registered office: 109, Colmore Row, Birmingham.

Hays (Preston), Ltd.—Private company. Registered May 29th. Capital, £300 in £1 shares. Objects: To carry on the business of electricians, mechanical and electrical engineers, &c. The first directors are: T. Hay, electrician, and Mrs. Mary K. Hay, both of 161, Norris Street, Preston. Solicitors: Ward & Dewhurst, 7, Lune Street, Preston.

Mid-Cumberland Electricity Co.—Public company. Registered May 27th. Nominal capital £10,000 in £1 shares. Objects: To acquire the undertaking under the Mid-Cumberland Electricity Special Order, 1930, and to carry on in the county of Cumberland and elsewhere the business of an electricity and gas lighting and power supply company in all its branches. The first directors are: H. E. Midgeley, Roydon Lodge, Erith, Kent (managing director of Ruths Steam Storage, Ltd.), and A. Ellis, 278, Newport Road, Cardiff (consulting engineer). Registered office: 4, South Parade, Leeds.

Buxton & Longley, Ltd.—Private company. Registered May 27th. Capital, £1,000 in £1 shares. Objects: To acquire the business and trade connection of Buxton & Longley, of 84, Brigstock Road, Thornton Heath, registered electrical contractors, and to carry on the business of electricians, mechanical engineers, manufacturers of generators and accumulators, suppliers of electricity, &c. The first directors are: W. A. Buxton, "Bracken-

hurst," Woolborough Road, Crawley (electrical contractor) and R. F. Longley, 19, Totten Road, Thornton Heath (electrical contractor). Registered office: 84, Brigstock Road, Thornton Heath.

Bond Wholesale Electrical Co., Ltd.—Private company. Registered May 27th. Capital, £100 in 1s. shares. Objects: To carry on the business of manufacturers, importers and exporters of, agents for and dealers in electric lighting, cooking, heating, power and all other kinds of electrical fittings and equipment, &c. The directors are: H. W. Hives, 17, Sandhurst Road, Leicester; R. E. Hives, B.Sc. (address not stated), and Mrs. B. M. Hives, 17, Sandhurst Road, Leicester. Secretary: A. A. Tanner, Eagle House, Friar Lane, Leicester.

Aero-Electrical Equipment Co., Ltd.—Private company. Registered May 22nd. Capital, £100 in £1 shares. Objects: To carry on the business of electrical, mechanical and constructional engineers, manufacturers and suppliers of all kinds of electrical apparatus, instruments and machines for use in connection with aviation, &c. The provisional directors are: E. A. B. Snoaden, 7, Woodlands Road, Barnes Common, S.W.13 (radio engineer), and R. Hollerhead, 58, Foxearth Road, Selsdon, South Croydon (radio-telegraph traffic manager). Registered office: 46, Victoria Street, S.W.1.

Marine Electrical Equipment Co., Ltd.—Private company. Registered May 22nd. Capital, £100 in £1 shares. Objects: To carry on the business of electrical, mechanical and constructional engineers, manufacturers and suppliers of all kinds of electrical apparatus and machines for marine purposes, &c. The provisional directors are: E. A. B. Snoaden, 7, Woodlands Road, Barnes Common, S.W.13 (radio engineer), and R. Hollerhead, 58, Foxearth Road, Selsdon, South Croydon (radio-telegraph traffic manager). Registered office: 46, Victoria Street, S.W.1.

Returns of Electrical Companies

Electricity Co. of Macclesfield, Ltd.—Satisfaction to the extent of £30,000 on January 31st, 1931, of debentures authorised December 14th, 1923, and registered January 2nd, 1924. (Notice filed May 26th, 1931.)

Fraser Mares, Ltd.—L. S. Findlay, of 35, Windsor Place, Cardiff, ceased to act as receiver and manager on May 21st.

Edward Holme & Co. (1931), Ltd.—Mortgage debenture dated May 20th, to secure £10,000, charged on certain lands and buildings at Hale Moss, Hale, Bowdon, Cheshire, and the company's undertaking and property, present and future, including uncalled capital, if any. Holders: W. H. Bacon, Ship Canal House, King Street, Manchester; and others.

Electric and General Industrial Trusts, Ltd.—Issue on May 21st of £2,500 debentures, part of a series already registered.

Electric Supply Co. of Victoria, Ltd.—Charge created outside the U.K. dated December 19th, 1930, to secure £15,635, and any further sums hereafter to be lent, charged on the company's undertaking and assets. Holders: State Electricity Commission of Victoria. (Registered March 11th, 1931.)

Power Construction Co., Ltd.—Charge on freehold land at Gunnersbury, dated May 22nd, to secure £7,300. Holders: L. Firth, Hartley Street Dye Works, Dewsbury; and others.

Drake & Gorham, Ltd.—Satisfaction in full on various dates from June 24th, 1930, to May 9th, 1931, of mortgage dated June 18th, 1930, and collateral mortgage dated November 6th, 1930, and registered July 3rd, 1930, and November 18th, 1930, respectively, securing £13,350.

Particulars filed of £60,000 debenture stock authorised April 21st, 1931, and covered by trust deed dated March 7th, 1931, the whole amount being now issued. Property charged: Properties in Acton and Westminster, 69,500 fully paid £1 shares in Drake and Gorham Wholesale, Ltd., and the company's undertaking and other property, including uncalled capital. Trustees: Glyn Mills and Company.

Metalcraft, Ltd.—W. G. Frazer, of 271-3, Oxford Street, W.1, was appointed receiver and manager by Order of Court dated May 18th.

R. C. Seal & Co., Ltd.—C. F. Farmery, of Danes Inn House, 265, Strand, W.C., ceased to act as receiver and manager on May 13th.

Voltron Electric, Ltd.—Particulars filed of £1,000 debentures authorised March 24th, 1931, the whole amount being now issued. Property charged: All book debts, present and future, as well as all its stocks, manufactured or otherwise, present and future. The company's undertaking, its assets, other than as above, and its uncalled capital, are excluded from the charge hereby created.

Celestion, Ltd.—Charge on properties, &c., in Kingston-on-Thames, dated April 30th, 1931, to secure all moneys due or to become due from the company to the Westminster Bank, Ltd.

Egyptian Power Syndicate, Ltd.—Capital, £10,000 in £1 shares. Return dated December 12th, 1930. Two shares issued and fully called up. Mortgages and charges, nil.

Gothic Electrical Supplies, Ltd.—Capital, £6,000 in £1 shares. Return dated January 14th, 1931. All shares taken up. £5,400 paid and £600 considered as paid. Mortgages and charges, nil.

Erskine, Heap & Co., Ltd.—Capital, £50,000 in 10s. shares. Return dated April 6th, 1931. 46,489 shares taken up. £4,413 paid, £18,831 10s. considered as paid. Mortgages and charges, nil.

Vic-Ray Electric Co., Ltd.—Capital, £1,000 in £1 shares. Return dated January 14th (filed March 26th), 1931. 377 shares taken up. £377 paid. Mortgages and charges, nil.

Household Electrical Supplies Company, Ltd.—Capital, £20,000 in 15,000 preferred ordinary shares of £1 and 100,000 deferred shares of 1s. each. Return dated March 13th, 1931. 1,100 preferred ordinary and 26,000 deferred shares taken up. £2,400 paid. Mortgages and charges, nil.

Erewash Electric Wire Co., Ltd.—Capital, £3,000 in 2,500 preferred shares of £1 and 2,000 ordinary shares of 5s. each. Return dated December 31st, 1930 (filed May 6th, 1931). 1,067 preference and 2,000 ordinary shares taken up. £3 paid on three preference shares, £1,564 considered as paid on 1,064 preference and 2,000 ordinary shares. Mortgages and charges: £1,000.

Derby Accumulator Supply Co., Ltd.—Capital, £1,000 in £1 shares. Return dated January 14th, 1931 (filed April 18th, 1931). 580 shares taken up. £360 paid, £220 considered as paid. Mortgages and charges, nil.

Radios Electrical, Ltd.—Capital, £500 in 300 preference and 200 ordinary shares of £1. Return dated December 16th, 1930 (filed April 23rd, 1931). 500 shares taken up. £300 paid on the preference shares, £200 considered as paid on the ordinary shares. Mortgages and charges, nil.

Electrical & Radio Products, Ltd.—D. L. Honeyman, C.A., of 9, Basinghall Street, E.C.2, was appointed receiver on May 13th, under powers contained in debentures dated January 30th, February 17th, and March 13th, 1931.

City Notes

Ever Ready Co. (Great Britain), Ltd.

The annual meeting was held on June 1st, Mr. Magnus Goodfellow (chairman) presiding. In presenting the report and accounts (ELEC. REV., May 15th, p. 847), the chairman said that during a year of depression and of generally shrinking consumption, a careful estimate of the consumption of primary dry batteries of all types used in this country showed an increase of as much as 20 per cent. over the previous year. They not only obtained a full proportion of that increase in consumption, but also secured a considerable amount of business previously in the hands of foreign competitors. The Board of Trade returns showed that such imports were reduced during the year by some 15 per cent. as compared with the preceding year. The heavy increase in the sales during the year under review necessitated an expenditure of £20,000 in excess of the estimate of £30,000 on buildings and equipment given at the last annual meeting. In addition, since March 31st, further expenditure amounting to £45,000 had been sanctioned. It was their intention again to pass on to the consumer the savings in cost of production which they had achieved during the year, and they were working on the catalogues and literature generally, which it was expected would be issued by the end of the current month. They were grateful to the trade as a whole for the support it had given them in a difficult year, and they believed the large number of assurances of support already received for the coming year would assist them in a further increase of business, to the mutual benefit of consumers, the trade, and themselves. Regarding the future, the public use of primary batteries in every walk of life would continue to grow, as it had done during the past 20 years. Their sales for the two months to date showed an increase over the sales of the corresponding period of a year ago. The report and accounts were adopted.

International Telephone & Telegraph Corporation

This large American concern, which has interests in many parts of the world, published its report for 1930 last week. Its consolidated balance-sheet shows a total capital stock of $215,605,733; preferred stock of associated companies, $38,863,722; a funded debt of $187,599,022; and a total surplus of $78,804,276. The consolidated income account gives the total earnings as $104,472,598 and the total expenses as $79,115,044, leaving net receipts of $25,357,554. After meeting charges of associated companies and debenture bond interest, the net income is $13,750,133, which, added to the earned surplus at January 1st, 1930, gives a total of $41,804,840. Dividends and other charges absorbed $19,159,022, leaving an earned surplus of $22,645,817. The report contains a survey of the activities of the corporation and its associates during the year. Reference is made, among other matters, to the acquisition of the Shanghai telephone system; important orders secured by Creed & Co., Ltd.; and the ultra-short-wave telephone transmission demonstration carried out by the Hendon laboratories in conjunction with the laboratories of Le Matériel Téléphonique, France (ELEC. REV., April 10th, 1930). A list of associated and subsidiary companies appended to the report includes the following concerns in England:—The Commercial Cable Co., Ltd.; Creed & Co., Ltd.; Standard Telephones and Cables, Ltd.; the International Marine Radio Co., Ltd.; and the International Telephone and Telegraph Laboratories, Inc.

Einstein's Electro-Chemical Process, Ltd.

The report for 1930 shows a loss of £38,454, making the total debit balance at profit and loss £60,008. According to the *Financial News*, the auditors state that no provision has been made for depreciation on plant, machinery, &c., and they question the value of patents and processes, some of which have been abandoned. The directors report that many of the anticipations have not been realised, but the company is now in possession of a sound competitive proposition with certain advantages, which is capable of being developed into a profitable business. As a result of consultations with a committee of the largest preference shareholders, a call of 2s. was made on the preference shareholders on March 6th, and it is hoped that this will prove sufficient to enable the company to carry out the programme which has been laid down.

Power Investment Corporation, Ltd.

The report for the year ended March 31st last states that in view of the fact that the nature of the business has in the last year or two in fact been carried on as an investment trust company and not a finance company, the directors have decided to convert the Corporation into an investment trust company. A resolution for that purpose will be submitted to an extra-

ordinary meeting to be held immediately after the annual meeting on June 23rd. The accounts now presented have been drawn up in trust company form, and show a profit of £48,246, to which is added the balance brought forward, making £87,992. The preference dividend absorbs £26,819, and £5,343 has been written off, representing loss on realisation of investments, less reserve. A dividend of 4 per cent., less tax, is recommended on the ordinary stock, leaving £39,201 to be carried forward.

Calcutta Tramways Co., Ltd.

The report for 1930 shows a revenue of £26,448, against £102,791 in the previous year, to which is added £16,000 withdrawn from reserve for contingencies, and £13,284 brought forward, making £55,732. The debenture service absorbs £37,753, and the preference dividend requires £12,500. No dividend is recommended on the ordinary shares (against 1s. 2¼d. per share, tax free, in 1929). The amount carried forward is £5,480. The report states that the reduction in traffic receipts is attributable to general trade depression, to political conditions, including strikes, which have involved serious disorganisation to traffic and damage to some of the company's rolling stock, and to intensified and indiscriminate omnibus competition. The loss which the company incurred in maintaining its omnibus service, owing to the chaotic conditions prevailing in Calcutta streets, reached such proportions that the directors abandoned all services, except that between Howrah railway station and Esplanade, as from February 1st last.

Electric Supply Corporation, Ltd.

The report for 1930 shows gross earnings of £96,030, and a net revenue of £55,443. It is proposed to transfer £5,437 to repairs, renewals and depreciation fund, and to pay a final dividend of 7 per cent. on the ordinary shares, making 11 per cent. for the year (same). The amount carried forward is £23,297 (against £20,415). The report states that the Urban District Council of Hitchin is purchasing the undertaking in that town; the purchase, which will take effect as from July 1st, is subject to an agreement now being prepared. The electrical energy sold amounted to 10,179,135 kWh, against 10,556,881 kWh.

Electric Construction Co., Ltd.

The report for the year ended March 31st shows a net loss, after providing for debenture interest and depreciation, of £11,424. The directors have transferred £20,000 from the dividend equalisation fund, to which is added £1,368 brought forward, and after deducting the net loss there is a balance available of £9,944. It is proposed to pay a final dividend of 7 per cent. per annum on the preference shares, leaving £5,549 to be carried forward. The report states that the increased demand for the company's products, reported last year, was not maintained. This was attributable to the prolonged industrial depression and to a curtailment of export business. The works were not fully employed during any part of the financial year, and a loss in manufacturing was, therefore, unavoidable.

German Company

The report of the *Prussian Electrical Company* ("Preag") for 1930 shows a net profit of RM. 7,508,000, as compared with RM. 5,516,000 in the preceding year, and the dividend is maintained at 6 per cent. The company has expanded considerably during the year, investments at RM. 110,695,800 showing an increase of more than 66 per cent. over 1929. Following its participation in the formation of the new Berlin Power and Light Co., shareholders have authorised an increase in the capital by RM. 30,000,000, which will be issued to shareholders *pro rata* at 120 per cent. The sales of electricity by "Preag" subsidiaries increased during 1930 by 5.7 per cent. to 682,826,718 kWh.

Philips Glowlamp Works

The accounts for 1930 show gross profits of £1,065,000, as compared with £3,580,000 in the preceding year. After writing £310,000 off stocks, £220,000 off shareholdings, and placing £82,000 to reserve against bad debts, there is a net profit of £453,000, against £1,790,000 in 1929. A dividend of 6 per cent. is proposed on the ordinary shares (against 21 per cent.). The report states that the financial results are disappointing. During the first part of 1930 the directors were optimistic as to the future, but in September there was a strong reverse.

The report of the *Hastings and District Electric Tramways Co.* for 1930 states that the revenue account of the operating company (Parliamentary company) shows a loss of £3,180. The profit and loss account of the parent company has been debited with unpaid interest for the year on the 5 per cent. debenture stock and on the 7 per cent. notes, and shows a loss of £24,316. Omnibus competition has been diminished by an arrangement under which all parties conform to an agreed schedule of services and time.

The report of the *Para Electric Railways and Lighting Co., Ltd.*, for 1930 shows gross receipts of £166,596, as compared with £182,071 in the preceding year, and a net revenue of £56,802 (against £74,113), to which is added interest, &c., making £58,034. After deducting debenture interest, &c., and adding £3,604 brought forward, there is a balance of £16,440, of which £10,000 is placed to depreciation and renewals reserve, leaving £6,440 to be carried forward. Meeting: June 8th.

Lisbon Electric Tramways, Ltd.—The report just issued shows that after providing for debenture interest, &c., the net profit for the past year is £179,614, an increase of £1,303 on the 1929 figure. A balance of £28,085 brought forward is added, making available £207,699. The ordinary dividend is maintained at 7 per cent.; £58,000 (against £50,000) is transferred to general and depreciation reserve; £10,000 (the same) to exchange reserve; and £10,000 (against £15,000) to staff fund. A balance of £37,593 remains to be carried forward.

Telephone Rentals, Ltd., which took over part of the business of the Telephone Manufacturing Co., Ltd., in 1929, reports a net profit of £48,330 (against £50,748 for part of 1929). To this is added a balance of £27,122 brought forward, making £75,452. The dividend is raised from 5 to 6 per cent.; £30,000 (against *nil*) is put to reserve; and £17,552 is carried forward.

The report of the *Worcester Electric Traction Co., Ltd.*, for 1930 shows a total revenue of £4,999, and after deducting all expenses and adding £2,495 brought in, the total available is £6,861. An ordinary dividend at the rate of 5 per cent. for the year is proposed, leaving £2,091 to be carried forward.

The board of the *Barcelona Traction, Light and Power Co., Ltd.*, has announced that owing to the serious fall in the value of the peseta it may be necessary to defer payment of the dividend on the ordinary shares, usually made during June.

The *Brazilian Traction, Light and Power Co., Ltd.*, has announced a quarterly dividend of 1¼ per cent. on the outstanding preference shares.

The directors of the *Hydro-Electric Securities Corporation* have declared a quarterly dividend of 35 cents per common share, payable June 19th.

A final dividend of 10 per cent. is announced by *Callender's Cable and Construction Co., Ltd.*, making 15 per cent. for the year (same).

A dividend is announced by the *Shawinigan Water and Power Co.* of $0.62 on the common shares for the quarter ending June 30th.

The *British Columbia Power Corporation* has declared the usual dividend of 50 cents per share on the class "A" shares for the quarter ending June 30th.

The *Quebec Power Co.* has declared a dividend of $0.62½ on the common shares for the quarter ending June 30th.

Stocks and Shares

TUESDAY EVENING.

IT is not to be gainsaid that the Stock Exchange is still the centre of disturbed finance. Difficulties have arisen in various parts of Europe, coming to a head on the Continent in the failure of the Credit Anstalt, which necessitated the formation of a strong international committee, with Mr. Lionel de Rothschild as chairman. On top of this, the New York Stock Exchange has experienced a fresh outburst of selling. A circumstantial rumour came into circulation to the effect that the Brazilian State and Provincial Governments were recommended to suspend payment of interest and sinking fund. This elicited a prompt denial, but Brazilian issues as a whole are heavy, the utilities amongst them.

In spite of renewed strength in British Government stocks, London Power 5 per cent. debenture, after being 5¼ premium, eased off to 5 premium. Central Electricity 4½ per cent. debenture went ex 30s. dividend to-day, Tuesday. Subsequent interest payments will be at the full rate of 2¼ per cent., less tax, each half year.

Electricity Supply Shares

Kensington ordinary shares strengthened to 30s., this being the only change which has occurred in the list of London ordinary shares. Bournemouth & Poole, amongst provincial issues, are 1/16 up at 58s. 9d. County of London retain their strength at 45s., and Clyde Valley shares at 32s. 9d. Lancashire Electric 5 per cent. debenture is offered in a modest way at 100½, to pay £4 19s. 6d. per cent. on the money. The security is well covered. Electric Supply Corporation are unchanged at 42s. 6d., after their fall of last week. The dividend, as already announced, makes 11 per cent. for the year. The meeting will be held on the Monday in next week, June 8th, when the chairman is likely to have an interesting account to give of the year's working and of the future prospects. Scottish Power preference, at 24s. 6d., show a modest improvement. South Metropolitan second preference are better at 23s. 9d. The Electric Construction Company reports a loss for last year of £11,424, against a net profit in 1929-30 of £14,800. The dividend on the 7 per cent. preference shares is to be paid, but there is, of course, nothing for the ordinary shares.

Manufacturing and Equipment

Callender's Cable and Construction Company has announced a final dividend of 10 per cent., making 15 per cent. for the year, this being the same as that which has been paid for some years past. The price of the shares had risen to 2¼, but reacted to 2 7/16, leaving a rise on the week of 3s. 9d. British Insulated are 1/16 up at 2⅛. The British Aluminium Company announces that, in accordance with the intimation given last March, the outstanding 5 per cent. prior lien debenture will be redeemed on the last day of this month at 105. It may be remembered that in December last the company made an issue of 2½ million pounds 5 per cent. first mortgage debenture stock.

out of the proceeds of which the prior lien debentures are to be repaid. The price of the new stock is 95 middle, at which the return on the money, without allowing for redemption, comes to 5¼ per cent. Siemens retain their improvement at 20s. 9d., and Henley's keep good at 4⅛. Philips' Incandescent Lamp shares have further fallen to 17s. 6d. The report refers to forced liquidation by competitors, and, in addition, a fall in prices was accentuated, and loss incurred, by the company's having to take back goods already supplied. Moreover, large provision has had to be made against depreciation of stocks. The directors look to a return of more normal conditions that will enable the company's sound position and excellent organisation to achieve favourable results.

Telephone Rentals

Telephone Rentals, which, it will be remembered, arose out of the old Telephone Manufacturing Company, made a profit for the year just ended of £48,000, showing a small reduction on the net earnings of the previous period. The dividend has been raised, however, from 5 per cent. to 6 per cent., the previous year's distribution having been made on very conservative lines. The price of the shares is steady at 3s. Telephone Manufacturing (1929) remain at 1s. 9d. No changes have occurred in Automatic Telephones at 32s. 6d., or in International Automatic Telephones at 28s. 9d. The ordinary and the "B" deferred shares of the last-named company have now come into line as regards the market quotation.

Foreign Traction

Brazilian Tractions have fallen to 13½, and dollar utilities are, generally speaking, flat, in consequence of a new and violent break in Wall Street at the beginning of this week. Rio Tramways 5 per cent. first mortgage bonds have dropped to 95, and the 5 per cent. 50-year mortgage bonds to 81½. Argentine Tramway issues are flat. Buenos Aires Lacroze Trams consolidated mortgage debentures fell 7 to 52½. The company's first mortgage debenture stock stands at 75½, and the extension mortgage debentures at 68½. All these debenture issues carry 5 per cent. interest. Anglo-Argentine Tramways 4 per cent. debenture is 3 points down at 50, and the 4½ per cent. debenture is similarly lower at 45½. The 5 per cent. debenture has dropped 4 to 23½. Mexicans are heavy, Mexico Tramways first mortgage bonds shedding 2 points to 42½.

Cables and Wireless

There is nothing encouraging to report to holders of Cables and Wireless stocks. The 5½ per cent. preference is 2 points down at 50½. Provided the dividend is duly met, at this price the stock shows nearly 11 per cent. on the money. The 7 per cent. "A" ordinary at 11 and the "B" ordinary at 7, stand at what the Stock Exchange calls option prices; that is to say, money which is put into the stocks at the present levels must be regarded as likely either to be lost or to be doubled in value. International Telephone & Telegraphs have dropped to 25½, which is a little lower on the week, while American Telephone & Telegraphs are down 5 at 165. The annual report of the International Company states that to meet new conditions of business, a thorough-going programme of readjustment was initiated. The company's stockholders now number 81,617. The dividend for 1930 was maintained at 2 dollars per share, being the same rate as that paid in 1929. Great Northern Telegraphs at 25 show a nominal loss of £2, but an allowance must be made for deduction of the dividend, on Monday in this week, of 30s. per share, less tax. Marconi Marines have gone back to 30s. On the 15 per cent. dividend which the company paid for last year, the return to a present purchaser comes to 10 per cent.

Tubes and Tractions

Home Railway stocks are in sorry case. The steam companies appear to be without any friends. Undergrounds have come fairly well through a trying week. The only change is a reversion to par, 20s., in Underground Electric Railways ordinary shares. Up to the present, the prior-charge stocks in this group are holding their ground firmly, in correspondence with purely gilt-edged issues of most kinds.

British Electric Traction deferred ordinary stock at 975 is 75 points down, and a small amount changed hands at 900. Other transactions were recorded on the same day at 950 and at 970. The London tramway descriptions are unchanged.

Miscellaneous Matters

American Utility issues are flat. Falls of several dollars have occurred in Montreal Light & Power at 41½, Power Corporation of Canada at 40 and Shawinigan at 36½. Amongst Indian investments, Madras Electric Supply 7 per cent. second debentures are dull at 100½. In the iron and steel group, Babcock & Wilcox gave way to 41s. 3d., a fall of 1s. 9d.; Vickers are 6s. 3d. The rubber share market is without vitality.

Increase in Electric Power Consumption

A leading Stock Exchange firm of dealers have compiled a table giving details of units sold by eleven electric light and power companies during the half decade 1926-1930 inclusive. The table shows an average increase of 78 per cent. during the five years. County of London has the largest increase percentage of 207, followed by the Scottish Power Company with 189. Following these, the increases are Midland Counties 137 per cent.; Metropolitan Electric 126 per cent.; Northampton Electric 107 per cent.

Share List of Electrical Companies

Home Electricity Companies

	Nom.	Approx. Dividend 1929.	1930.	Price June 2 1931.	Rise or fall.	Yield p.c.
	£					
Bournemouth and Poole	1	15	15	38/9	+1/6	5 2 2
Brompton Ordinary	1	8½	8½	28/-	—	5 0 0
Central Electricity 4½% Deb. ...	Stock	—	4½	96xd	—½	4 14 0
Charing Cross Ordinary	1	8½	8½	29/6	—	4 15 0
Chelsea	1	8⅞	8⅞	27/6	—	5 1 10
City of London	1	10	10	36/3	—	5 10 3
Clyde Valley	1	8	8	32/-	—	5 0 0
County of London	1	7	10	45/-	—	4 9 0
Edmundsons' 7% Pref.	1	7	7	25/6	—	5 9 10
Elec. Supply Corporation	1	11	11	42/6	—	5 3 9
Kensington Ordinary	1	8	8	30/-	+6d.	4 13 4
Lancs. Light and Power	1	7	6½	21/8	—	6 2 4
London & Home Counties 4½% Deb.	Stock	—	—	98	—	4 12 0
London Electric	1	8½	9	34/-	—	5 5 11
Metropolitan	1	9	10	40/9	—	4 18 3
Midland Counties	1	6½	7	26/3	—	5 6 8
Mid. Elec. Power	1	15	8	27/6	—	5 16 5
Newcastle-on-Tyne Ordinary ...	1	6	6	21/3	—	5 13 0
do. 7% Pref.	1	7	7	27/-	—	5 3 8
Notting Hill 6% Pref.	10	6	6	11½	—	5 6 8
North Met. Elec. 6% Pref.... ...	1	6	6	24/-	—	5 0 0
St. James' and Pall Mall	1	8	8	28/6	—	4 18 3
Scottish Power	1	8	8	27/6	—	5 16 5
South London	1	8⅛	8⅛	27/6	—	5 1 10
Urban Ordinary	1	7	7	28/-	—	5 0 0
Westminster Ordinary	1	8½	8½	28/6	—	4 18 3
Whitehall Elec. Invst. 7½% Pref....	1	7½	7½	24/6	—	6 2 5
Yorkshire Elec.	1	8	8	30/-	—	5 6 8

Home Rails

Central London Ord. Assented ...	Stock	4	4	76	—	5 5
Metropolitan	,,	4	3½	46½	—	7 10 6
do. District	,,	5	5	64½	—	7 15 0
Underground Electric	£1	8	8	20/-	—6d.	8 0 0

Telegraphs and Telephones

Anglo-Am. Tel. Pref....	Stock	6	6	103½	—	5 16 0
do. Def.	,,	1½	1½	25½	—	5 17 8
Automatic Telephone	1	12½	12½	32/6	—	7 13 10
Cables & Wireless 5½% Pref. ...	Stock	5½	5½	50½	—2	10 17 10
do. A 7½% Ord.	,,	Nil	—	11	—2	... ...
do. B Ord.	,,	Nil	—	7	—½	... ...
Globe Tel. and T. Ord.	10	10	—	8½	—	... ...
do. do. Pref.	10	6	6	9	—½	6 13 4
Great Northern Tel.	10	20	20	25xd	—1	8 0 0
Marconi-Marine	1	15	15	30/-	—1/6	10 0 0
Oriental Telephone Ord.	1	12	12	22½	—	*5 6

Home and Foreign Trams, &c.

Anglo-Arg. Trams First Pref. ...	5	1½	—	12/6	—½	... ...
do. do. 2nd Pref. ...	5	6	—	7/6	—	... ...
do. do. 5% Deb. ...	Stock	5	5	23½	—4	21 7 0
British Electric Traction Def. Ord.	,,	5	975	1025	—75	... ...
do. do. Pref. Ord. ...	,,	8	—	122½	—	6 10 8
Brazil Traction	100	8	—	13½	—1½	... ...
Brit. Columbia Elec. Rly. Pcc. ...	Stock	5	5	97½	—	5 2 7
London & Sub. Trac. 5% Pref. ...	1	Nil	Nil	11/6	—	... ...
London United Tram Deb. ...	Stock	4	4	62½	—	6 8 0
Mexico Trams, 5% Bonds	—	5	5	42½	—3	11 15 4
Mexican Light Common	100	Nil	Nil	38½	—	... ...
do. 7% Pref.	100	7	7	66½	—	10 10 6
do. 1st Bonds	—	5	5	79	—	6 6 7
Victoria Falls Ord.	1	15	15	57/6	—6d.	5 4 2
Yorkshire (West Riding)		Nil	Nil	5/6	—	... ...

Manufacturing Companies

Assoc. Elec. Ord.	1	6	6	18/6	—	6 9 9
do. Pref.	1	8	8	27/6	—	5 16 0
Babcock & Wilcox	1	15	14	41/3	—1/9	*6 16 0
British Aluminium Ord.	1	10	10	25/-	—	8 0 0
British Insulated Ord.	1	15	15	26½	+⅛	5 14 2
Brush Ord.	Stock	10	5	60xd	—	8 5 0
Callenders	1	15	15	2⅛	+⅛	6 3 0
do. 6½% Pref....	1	6½	6½	25/-	—	5 4 0
Crompton Parkinson Ord.	5/-	30	30	1½	—	8 0 0
do. 8% Pref.	1	8	8	28/-	—	5 14 5
Edison-Swan 1st Pref.	1	7½	7½	29/9	—	6 6 4
do. 5% Deb.	Stock	5	5	94½	—	5 5 10
Electric Construction	1	5	Nil	11/3	—⅛	... ...
Enfield Cable Ord.	1	25	25	32½	—	6 14 1
English Electric	1	Nil	Nil	5/-	—	... ...
do. do. Pref.	1	Nil	Nil	5/-	—	... ...
Ferranti Pref.	1	7	7	21/6	—	6 10 4
G.E.C. Pref.	1	6½	6½	26/-	—	5 0 0
do. Ord.	1	14	14	35/9	—2/3	7 16 5
Henley	1	30	—	4⅛	—	6 9 10
do. 4½% Pref.	5	4½	4½	4½	—	5 2 10
India-Rubber	1	Nil	Nil	5/-	—	... ...
Johnson & Phillips	1	10	10	27/6	—	7 5 6
Siemens Ord.	1	7½	7½	20/9	—	7 4 7
Telegraph Construction	12	10	7½	13	—	6 18 3

*Dividends paid free of Income Tax.

The Belgian Electrical Situation

Effect of world depression now being felt

MR. N. S. REYNTIENS, O.B.E., Commercial Secretary to the British Embassy, Brussels, has forwarded a report on economic conditions in Belgium during the past year. This is available from the Stationery Office, price 4s. net.

With the exception of France, Belgium has suffered the least of all European countries from the economic stress of the past few years, but, as with France, the country could not escape unscathed, and during 1930 the effects of the depression began to be felt.

In June last the decline in production and exports became marked, and during the period January to September there was a decrease of 3,718 million fr. (to 20,099 million fr.). At the same time, imports fell by about 2,500 million fr. to 24,011 millions (175 fr.=£1). After a survey of the position, Mr. Reyntiens repeats the opinion expressed on all sides that as Belgium was the last to feel the effects of the universal depression so will she be also the first to recover.

Electrical Industry and Trade

The electrical machinery and apparatus industry has not remained unaffected by the general situation, and although most of the works remained busy during the year, orders were becoming scarce in the autumn. Owing to the development of rural electrification and the extension of the telephone and radio services in recent years, the industry has suffered little, if any, unemployment, and there were no strikes during 1930. Electrical manufacturing works holding accumulated stocks of raw material, especially copper, have been adversely affected by the slump in metal prices.

During the first nine months of 1930 exports of dynamo-electric machinery, submarine cables, and electrical apparatus and parts improved in value by 30, 15, and 150 per cent., respectively, as compared with the corresponding period of the preceding year. In the autumn, however, for the first time for many years, the export trade showed signs of weakness. This diminution is attributed by manufacturers to the protectionist methods and general economic depression abroad. They claim, further, that the home market is insufficiently protected.

Imports and Exports

The volume of exports of dynamos rose from 1,854 tons in January-September, 1929, to 2,407 tons in the corresponding period of last year, and the value from 30.6 million fr. to 48.5 millions. Holland was the chief customer, followed by the Belgian Congo, Argentina, France and Spain. Great Britain's purchases declined from 99 to 86 tons. Imports of this class rose from 3,522 tons to 6,163 tons (from 99.4 million fr. to 139.1 millions). These came principally from France, Sweden, Germany and Switzerland, the United Kingdom being responsible for 139 tons.

Cable exports increased from 3,830 tons (33.7 million fr.) to 4,266 tons (40 million fr.), due mainly to the greater quantity supplied to the United Kingdom—2,044 tons, against 1,381 tons. Germany, Holland, the Belgian Congo, and Argentina were also important customers. The imports of cables were tenfold, rising from 304 tons (3.3 million fr.) to 3,436 tons (38.9 million fr.), Germany supplying the bulk of these.

There was a fall in exports of "electric apparatus, parts, &c., without insulating equipment"—from 460 tons (18.1 million fr.) to 432 tons (18.3 million fr.), but in the case of similar apparatus "with insulating equipment" there was a rise from 544 tons (9.8 million fr.) to 679 tons (12.2 million fr.). Imports of the first class advanced from 1,223 tons (62.2 million fr.) to 1,776 tons (96.8 million fr.), Germany and France being the principal suppliers; Great Britain supplied 173 tons. There was also a rise in imports of the second class—from 1,571 tons (81.7 million fr.) to 2,564 tons (115.2 million fr.). The shares of Germany and France showed a substantial increase, but Great Britain provided only 78.5 tons.

Electricity Supply

Although the general industrial crisis is said to have handicapped progress in the electricity supply industry, compensation has been forthcoming in the shape of new consumers and the Antwerp and Liége Exhibitions. The electrification of rural districts has been actively continued, and it is stated that out of 2,672 communes only 250 remain to be connected with central power stations. In those villages already connected up 90 per cent. of the inhabitants use electric light. It is anticipated that in five or six years' time every part of Belgium will have a supply of electricity available.

It is estimated that over 4,000 million fr. has been invested in the electric light and power industry, the bulk of which (3,500 millions) is attributed to private undertakings. Before the war hydro-electric power had only been employed in small works. Since the Armistice, however, larger schemes have been considered, and the first installation of this kind is the hydro-electric station of the River Warche.

The remarkable expansion of the electrical industry in Belgium may be gauged from the considerable increase in consumption, which rose from 1,650 million kWh in 1923 to 4,150 million kWh in 1929. This development is ascribed to rationalisation, concentration, and to the extension of the distributing system.

Communications

The receipts from the Belgian telegraph system showed a further decline last year, but the telephone service continued to advance. The number of subscribers on September 30th last was 220,067, against 191,338 a year earlier; about half of these were connected to automatic exchanges. The law of July 19th, 1930, creating a Régie of telegraphs and telephones, came into force on November 1st, 1930. A special fund, amounting in all to 600 million fr., will be placed at the disposal of the Régie at the rate of 180 millions a year to ensure its financial autonomy as from January 1st, 1934. From that date the Régie will pay 5 per cent. per annum interest to the State. International telephony is being developed, and it is hoped shortly to establish communications between Belgium, Roumania, and Estonia and to extend the telephone facilities between Belgium and Italy. It is also hoped to connect up in the near future with the principal countries of Africa and Asia.

During 1930 an additional submarine cable, with 21 circuits, was laid between the United Kingdom and Bélgium. The Belgian Government is at present engaged in the adaptation of the radio installations at Ruysselede and Liedekerke to the beam system.

Prospects in Peru

THE Commercial Secretary at the British Legation, Lima, has prepared for the Department of Overseas Trade a confidential report on the market for electrical machinery and apparatus in Peru.

This states, by way of introduction, that the Peruvian market for electrical goods and apparatus of all descriptions is not inconsiderable, and after a return to normal conditions a healthy expansion for this class of products may be looked for. While Great Britain's share of the trade for the four years from 1926 to 1929 averaged only 13 per cent., the United States secured 45 per cent. and Germany 24 per cent. The position is hardly a satisfactory one, having regard to the standing of the British electrical industry. It is explained by the higher price charged for the superior British article, which practically excludes it from this market, where price is the main consideration.

The British share would not be so large as it is were it not for the fact that a British company holds the concession for administering the postal and telegraph services of this country, while one of its subsidiaries holds a concession for the long-distance telephone service. This accounts for our securing 77 per cent. of the trade in telegraphic instruments and a similar proportion of the telephone cable business, while our participation in most other electrical lines is no more than 4 or 5 per cent.

The Requirements of the Market

Investigation into the methods of trading and the channels through which the trade flows elicited the information that only one British firm established in Lima holds agencies for British electrical products against over a dozen Peruvian, German, American, Italian and Swedish firms, which hold agencies for electrical products of non-British manufacture. British manufacturers should bear in mind that, unless they can compete with the type of apparatus required, which is not British standard, and also in price, and at the same time offer the usual trading terms of 90 days' credit against local acceptance, any time and effort expended in an endeavour to enter this field will be wasted.

Owing to the incomplete method of classification in the official statistics published by the Government, it has not been found possible to ascertain even approximate figures of the imports of heavy electrical machinery into Peru. Estimates given vary considerably owing to the fluctuations in the demand for this particular industrial product, which depends largely on fresh capital investments or expansion of the existing industries of the country. It is understood, however, that the major portion is secured by the United States manufacturers owing to the predominance of American capital in the leading industries.

As for power plant, British heavy oil engines enjoy an excellent reputation in this country. Many such units have been in operation for years, even decades, and such of the manufacturers as are represented in Peru secure a fair share of the business available. A list of importers of electrical goods and apparatus is available on application to the Department of Overseas Trade.

Electrical Import Trade

An appendix to the report gives some details of the electrical trade in 1929—apparently the latest figures available. Great Britain's lead in the telegraph apparatus and telephone cable trade has already been referred to. In practically all other sections the lion's share was secured by the United States. This was particularly the case in the following items:—Accumulators and batteries, £P26,680* out of a total of £P30,784 (Great Britain £P1,608); copper wire, £P20,837 out of £P34,191 (Great Britain £P899); domestic apparatus, £P19,180 out of £P26,121 (Great Britain £P264); and copper cable (large sizes), £P14,177 out of £P15,336 (Great Britain £P125). Germany was the principal supplier of lamp brackets and chandeliers, copper cable (small sizes), lead-covered cable,

* £P1.73=£1 sterling.

arc lamp carbons, covered flex, incandescent lamps (up to 50 W) and electricity meters. Belgium was the principal supplier of switchboards. The total value of electrical imports rose from £P321,184 in 1928 to £P471,041 in 1929. Great Britain's share rose from £P32,667 to £P62,243 and that of the United States from £P135,514 to £P219,140; Germany's quota declined from £P94,005 to £P87,820.

Electricity Supply

A further appendix contains particulars of 50 electricity undertakings in Peru. Of these, 34 supply alternating current and the rest d.c. The pressures vary, but the most common is 220 V, 35 undertakings employing this voltage. In addition to these, a list is given of mining, agricultural and industrial concerns in Peru which have their own generating plants.

Electrical Imports of British Malaya

Comparison of Two Years' Figures

BELOW are given the values during 1929 and 1930 of the imports of electrical and allied material into British Malaya, together with notes of increases or decreases in the trade. (The Straits dollar has a value of 2s. 4d.)

	1929. $	1930. $	Inc. or. dec. $
Wire and cable, insulated—			
Total	1,943,000	1,521,000	−422,000
From United Kingdom ...	1,871,000	1,415,000	−456,000
„ Japan	11,900	15,400	+ 3,500
„ United States	2,900	4,200	+ 1,300
Electric lamps and parts—			
Total	156,000	106,000	− 50,000
From United Kingdom ...	55,900	63,600	+ 7,700
„ Continent of Europe	88,800	34,000	− 54,800
Electric lamp bulbs—			
Total	536,000	292,000	−244,000
From United Kingdom ...	204,000	105,000	− 99,000
„ Continent of Europe	188,000	105,000	− 83,000
„ United States	94,000	29,000	− 65,000
„ Japan	39,800	42,500	+ 2,700
Hand flash lamps—			
Total	613,000	106,000	−507,000
From United Kingdom ...	1,800	2,000	+ 200
„ United States	450,000	42,000	−408,000
Batteries and accumulators—			
Total	1,075,000	1,020,000	− 55,000
From United Kingdom ...	141,000	126,000	− 15,000
„ Japan	2,300	2,000	− 300
„ United States	843,000	801,000	− 42,000
Electrical instruments other than telegraph and telephone—			
Total	*	96,000	—
From United Kingdom ...	*	77,600	—
Telegraph and telephone instruments and apparatus, other than wireless—			
Total	*	440,000	—
From United Kingdom ...	*	428,000	—
Wireless apparatus—			
Total	115,000	154,000	+ 39,000
From United Kingdom ...	100,500	94,000	− 6,500
Electric lighting accessories and fittings—			
Total	333,000	272,000	− 61,000
From United Kingdom ...	222,000	212,000	− 10,000
„ Continent of Europe	71,000	25,500	− 45,500
„ Japan	30,000	23,400	− 6,600
„ United States	1,100	600	− 500
Electrical goods and apparatus (not machinery) not elsewhere mentioned)—			
Total	1,239,000	934,000	−305,000
From United Kingdom ...	1,033,000	790,000	−243,000
„ Continent of Europe	99,800	81,800	− 18,000
„ United States	96,000	57,000	− 39,000
Electric generators—			
Total	102,000	201,000	+ 99,000
From United Kingdom ...	91,000	192,000	+101,000
„ Continent of Europe	9,600	1,700	− 7,900
„ United States	300	3,300	+ 3,000
Motors—			
Total	485,000	245,000	−240,000
From United Kingdom ...	393,000	163,000	−230,000
„ Continent of Europe	43,000	48,000	+ 5,000
„ United States	42,000	29,000	− 13,000
Ignition magnetos—			
Total	19,000	22,000	+ 3,000
From United Kingdom ...	3,000	12,000	+ 9,000
„ Continent of Europe	12,800	6,700	− 6,100
„ United States	1,900	1,900	—
Convertors and transformers—			
Total	706,000	560,000	−146,000
From United Kingdom ...	691,000	526,000	−165,000
Other electrical machinery—			
Total	2,177,000	1,197,000	−980,000
From United Kingdom ...	1,660,000	804,000	−856,000
„ Continent of Europe	30,000	61,500	+ 31,500
„ United States	491,000	295,000	−199,000

* Not specified.

With rubber realising less than its cost of production on any estate—with perhaps one exception—in Malaya, the general trade outlook is naturally gloomy. No important constructional work is taking place and Government projects of this kind have been postponed. Little effect has yet been felt of the tin restriction scheme. The motor trade, generally a sound barometer of commercial conditions, promises little animation in the near future. Stocks of merchandise are decreasing but are not being replaced, and the credit situation is causing some anxiety.

Egypt's Electrical Imports

ON March 1st changes of classification were introduced into the statistics of Egypt's foreign trade, the electrical group being sub-divided in a very useful way. It is shown that out of a total value of £E56,000 of generators, motors and transformers imported during the period from March 1st to December 31st, £E36,000 represented machines between 50 kg. and 1,000 kg. in weight, £E14,100 1,000 kg. or over, and £E4,400 between 10 kg. and 50 kg. Of the first class France was the principal supplier with a value of £E8,400, Germany, Belgium and Great Britain following with about £E5,000 each. Germany was the largest supplier in the second class.

Imports of batteries and parts, totalling £E13,100, were supplied to the value of £E3,400 by Great Britain and £E4,400 by the United States; of accumulators and parts totalling £E14,000, by Great Britain (£E4,300), with Germany, France, and Italy following close together.

Holland, Austria, Hungary and Germany secured the bulk of the lamp trade.

In radio apparatus, imports of which were £E35,000 in the 10 months under review, as against only £E8,900 in the whole of 1929, the United States, Germany and Holland were each responsible for between £E6,000 and £E7,000, with Great Britain just under £E5,000.

Great Britain seems to be losing ground in the cable trade. In 1929 she supplied £E120,000 out of £E201,000 of armoured wire and cable, together with £E4,500 out of £E42,300 of insulated cables, but the following figures for the ten months of 1930 make manifest a considerable decline:—

	£E
Cable, insulated, submarine and subterranean—	
Total	87,200
From Great Britain	1,500
„ Belgium	11,000
„ France	25,700
„ Germany	42,000
Wire and cable insulated, other—	
Total	28,000
From Great Britain	2,400
„ Belgium	5,800
„ France	4,800
„ Germany	10,600

Under the heading of "electrical apparatus not elsewhere specified," Great Britain makes a better showing, particularly in the heavier lines.

The total value of the imports of electrical machinery, apparatus and parts during the ten months was £E1,750,000. No exact comparison with the previous year's figures is possible.

Polish Electrical Production

The Polish Statistical Department reports that the electrical manufacturing industry of Poland, working at about 60 per cent. of production capacity, produced equipment valued at £2,749,475 in 1930. The leading item of manufacture was electric wires and cables which had a value of £936,745, thus accounting for about a third of the total. The lamp factories produced 5,544,065 lamps valued at £285,525. Other leading items were: Accumulators and parts, £253,000; a.c. machines, £189,485; telephones and parts, £149,795; and telephone batteries and other accessories, £122,290. In recent years the Polish electrical industry has only supplied 55 per cent. of the country's requirements, the remainder being met by imports. According to the return, there are 45 works in the country engaged in electrical manufacture, all of which, with one exception, were in operation last year. The number of employés fell from 6,025 in 1929 to 4,903 in 1930.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

The British Industries Fair

In answer to your request for suggestions with regard to the British Industries Fair, although, by now, my views must be fairly well known, I should like to include them among the other expressions of opinion which should result from the invitation in your last week's leader.

Briefly, then, I have no doubt that London would be the best place at which the electrical industry should exhibit, but, above all, the date wants altering to a time when overseas visitors are here. It obviously does not matter *where* it is held, if the right people are not here to see it, and it has been very clearly demonstrated that people do not come from sunny lands (to which we may expect to do most of our electrical exporting) to England in February.

I am very glad you emphasise the point that it is as an overseas exhibition that the B.I.F. should be judged.

ERNEST E. SHARP.

London, *May 30th*, 1931.

[It will be recalled that the Chelmsford Committee fully considered the question of date and reported that the arguments in favour of the customary date outweighed those put forward in support of a change. The conclusion reached was stated thus:—"Pending any great development of the Fair which may introduce fresh considerations, we recommend that the Fair should continue to be held in February."—EDS., ELEC. REV.]

Indirect Lighting

In his article in your issue of the 22nd ult. on the excellent direct and indirect lighting of Lloyds Bank, Mr. D. H. N. Caley mentions the difficulty that may be encountered in keeping the ceilings white in the atmosphere of the City in order to maintain (I presume) the efficiency of the indirect lighting. The difficulty should not exist, because in the first place the ideal colour is mat cream, and, secondly, with efficient indirect lighting fittings the efficiency should not be impaired (should the ceilings be white or cream) for some length of time after it is due for redecoration, even in the City. While the photograph of the board room is excellent in detail, the lighting effect produced proves my former statement; otherwise there would not be the dark and light patches that are so obvious and indeed are no credit to this all important method, which is unquestionably the lighting of the future.

London, W.1, *May 29th*, 1931. E. GRIFFITHS.

Leakage Trips for 100-A Circuits

Referring to recent correspondence under the above heading, it would seem that Mr. Grierson in a laudable desire to keep down installation costs has lost sight of the real use of the earth leakage relay. To my mind, this protective gear will become essential to every installation, when the ramifications of the grid are completed, and consumers, especially domestic, are being supplied from phase to neutral at 230 volts a.c.

Earthing is a doubtful method of protection in this respect, because in the day to day running of a plant or use of domestic appliances little is known as to whether an earth point really constitutes a safety device. In proportion to the fault current, the resistance of the earth point of the neutral at the transformer sub-station, the resistance of the line to the fault, and the resistance of the earth point where a local fault may take place, all have an important bearing on the potential rise of earth connected appliances. If the earth resistance at the point where the fault takes place is unduly high, a dangerous rise of voltage is liable to take place on earth connected appliances. The earth leakage relay will keep this undesirable potential within safe limits.

I am of the opinion that until our legislators are satisfied that the present method of earthing is to provide adequate protection to consumers on the grid distribution, the possibility of having to adopt the earth leakage relay generally must always be kept in mind.

Jagatdal, Bengal, *May 13th*, 1931. HERBERT ROBERTSON.

Mica Insulation

In the opening paragraph of an article entitled "Mica Insulation," which appeared in your issue of May 29th, Mr. A. E. Williams states that "the chief mica-mining centres are India and America; smaller quantities being produced in Sweden and Austria." India is certainly the largest and the principal source of supply of muscovite mica both in block and splittings, the U.S.A. also contributing considerable quantities for domestic consumption in that country only; Canada and Madagascar are the main producers of phlogopite mica. Other mica-mining centres in their order of importance are Rhodesia, East Africa, Argentine, and Brazil, and, to a lesser extent, Australia and Russia, where large mica deposits exist which have not yet been fully developed. Neither Sweden nor Austria can be regarded as mica-producing countries of any serious value to the industry.

Mr. Williams states that micanite is manufactured from "waste mica such as cuttings and pieces which, owing to impurities, cannot be easily split," and he further remarks that "there is a growing tendency to the employment of mica compounds," in which he includes micanite.

In the year 1893 this company first introduced built-up mica insulation, generically known as micanite to the electrical industry in this country, since which time it has been continuously employed and is still used in very large quantities as a standard insulating material in the manufacture of all classes of electrical machinery, control gear, and other apparatus. Micanite is made from selected material, the raw mica being specifically mined and converted into splittings at the various sources of origin for this particular purpose, and most certainly not from waste mica which, owing to impurities, cannot be easily split.

In India, for example, the production of mica splittings for use in the manufacture of micanite has grown into quite an important industry. Owing to the high cost of pure mica in sheets of sufficient size for the majority of insulation applications, and its lack of flexibility, micanite has been developed and is used extensively for coil, slot, and conductor insulation in the form of tubes, troughs, and wrappings, and also for commutator insulation in the form of end rings and separators. Commutator micanite for use as segment insulation is generally manufactured from Indian muscovite and not from phlogopite, the latter variety of mica—which is more costly—being employed only for special applications.

Finely divided mica is under no circumstances used in the manufacture of micanite paper or cloth, which is invariably made from specially selected large, thin, flexible mica splittings.

STANLEY M. MOHR, *Managing Director*,
Micanite & Insulators Co., Ltd.

London, E.17, *May 30th*, 1931.

International Conference on Bituminous Coal

The Third International Conference on Bituminous Coal will be held at the Carnegie Institute of Technology in Pittsburgh, Pa., U.S.A., from November 16th to 21st, 1931. British representatives include Prof. William A. Bone, of the Imperial College of Science and Technology, London; Dr. Cecil Lander, director of the Fuel Research Board, London; Dr. R. Lessing, consulting chemist, of London; and Dr. W. H. Cadman, of the Anglo-Persian Oil Company, London. Other English fuel technologists who will either attend the congress in person or contribute papers are: Dr. M. Barash, West's Gas Improvement Co., Manchester; Messrs. Geoffrey M. Gill, consulting engineer, London; and J. Ivor Graham, deputy director, Mining Research Laboratory, The University, Edgbaston, Birmingham; Dr. E. S. Grumell, Imperial Chemical Industries, Ltd., Northwick; Prof. H. G. A. Hickling, Dept. of Geology, University of Durham, Newcastle-upon-Tyne; Messrs. Harald Nielsen, consulting engineer, London; P. C. Pope, secretary, The Institute of Fuel, London; N. E. Rambush, general manager, Power-Gas Corporation, Stockton-on-Tees; and Dr. F. S. Sinnatt, assistant director, Fuel Research Board, London.

France and Germany will also be represented. Profs. Mailhe and Camille Matignon, of the Sorbonne, and M. Andre Kling, director of the Municipal Laboratory of Paris, will contribute papers or attend the meeting.

From Germany will come Dr. Friedrich Bergius, Prof. Dr. Franz Fischer, and Prof. Dr. Ernst Berl. Twelve other German scientists have already accepted Dr. Baker's invitation to participate in the coal meeting.

Austria, Belgium, Holland, Poland, Spain, and Switzerland also will have representatives at the meeting.

The tentative programme shows that the economic side of the coal industry will be emphasised. The competition between natural gas, water, coal, and petroleum as sources of power will be one of the chief topics of discussion. Carbonisation, gasification, and liquefaction of coal, and new methods of utilisation will also be discussed by authorities in the several fields.

Dr. Thomas S. Baker, president of the Carnegie Institute of Technology, is responsible for the organisation and administration of the conference. He will be assisted by an advisory board composed of the following: Mr. James A. Farrell, president of the United States Steel Corp.; Mr. John Hays Hammond, mining engineer; Mr. Samuel Insull, public utilities; Mr. Frank B. Jewett, president, Bell Telephone Laboratories, Inc.; Hon. A. W. Mellon, secretary of the United States Treasury; Mr. F. A. Merrick, president, Westinghouse Electric and Manufacturing Co.; Mr. Auguste G. Pratt, president, Babcock and Wilcox Co.; Mr. H. B. Rust, president, Koppers Co.; Mr. Matthew S. Sloan, president of the New York Edison Co.; Mr. Gerard Swope, president, General Electric Co.; and Mr. W. C. Teagle, president, Standard Oil Company of New Jersey.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1929

33,872. "Arrangements for the distribution and regulation of the energy of stations connected to a ring line." Siemens-Schuckertwerke Akt.-Ges. November 7th, 1928. (348,042.)

1930

191. "Electrical insulation." I. G. Farbenindustrie Akt.-Ges. February 13th, 1929. (348,129.)

3,502. "Vacuum electric tube devices." E. Y. Robinson, and Associated Electrical Industries, Ltd. February 1st, 1930. (348,027.)

3,503. "Protective arrangements for electrical distribution systems." Associated Electrical Industries, Ltd. February 4th, 1929. (348,028.)

3,801. Light-sensitive device for generating electric currents." R. Audubert. February 4th, 1929. (348,109.)

3,830. "Scanning disks for transmitters in television." Sir J. A. Fleming. February 5th, 1930. (348,139.)

3,887. "Method of and apparatus for coating filamentary material." Standard Telephones & Cables, Ltd. (Western Electric Co., Inc.). February 5th, 1930. (348,176.)

3,888. "Selective control arrangements for printing telegraph systems." Standard Telephones & Cables, Ltd. (Western Electric Co., Inc.). February 5th, 1930. (348,110.)

3,915. "Key transmitters of the hepper type." A. G. Kershaw, H. M. Proud, and Westinghouse Brake & Saxby Signal Co., Ltd. February 5th, 1930. (348,035.)

3,932. "Electric accumulator and its process of manufacture." Soc. Anon. des Accumulateurs Monoplaque. April 30th, 1929. (348,112.)

4,004. "Insulated electric terminals." P. J. de Wet. February 6th, 1930. (348,143.)

4,165. "Mercury-vapour rectifier." Akt.-Ges. Brown & Boveri et Cie. May 21st, 1929. (348,146.)

4,187. "Electric batteries and containers for the same." A. Ansell. February 7th, 1930. (348,117.)

4,234. "Electric furnaces." W. I. Robertson. February 7th, 1930. (348,119.)

4,262. "Electric discharge tubes." General Electric Co., Ltd., and H. T. Ramsay. February 7th, 1930. (348,120.)

4,296. "Electrically-heated water-boilers." A. Chalmers. February 8th, 1930. (348,151.)

4,357. "Electric selective remote control systems." Siemens-Schuckertwerke Akt.-Ges. February 28th, 1929. (348,154.)

4,495. "Insulating compounds." Electrical Research Products, Inc. March 2nd, 1929. (348,192.)

5,004. "Electrolytic cleaning of wires, bands or the like." F. A. Hermann. February 14th, 1930. (348,205.)

5,026. "Dynamo-electric machines." G. A. Juhlin, D. B. Hoseason, and Associated Electrical Industries, Ltd. February 14th, 1930. (348,206.)

5,046. "Television and like systems and apparatus." J. L. Baird, and Television, Ltd. (in liquidation). February 14th, 1930. (348,211.)

5,055. "Intercommunication devices." Marconi's Wireless Telegraph Co., Ltd., C. B. Carr, and A. W. Whistle-Croft. February 14th, 1930. (348,212.)

5,060. "Insulating materials and methods of production thereof." Electrical Research Products, Inc., and F. C. Tomlins. February 14th, 1930. (Addition to 307,966.) (348,213.)

5,450. "Radio-receiving circuits." British Thomson-Houston Co., Ltd., and T. H. Kinman. February 18th, 1930. (348,233.)

5,715. "Brush-shifting devices for dynamo-electric machines." British Thomson-Houston Co., Ltd. (Compagnie Française pour l'Exploitation des Procédés Thomson-Houston). February 20th, 1930. (Addition to 318,977.) (348,240.)

6,535. "Sheaths for electric cables and other tubular members." Callender's Cable & Construction Co., Ltd., and A. E. Wilson. February 27th, 1930. (348,256.)

6,636. "Multiple-way electric controllers or switches." L. A. Ramsden. February 28th, 1930. (348,258.)

6,868. "Picture-telegraph and like systems." Telefunken Ges. für Drahtlose Telegraphie. March 13th, 1929. (348,260.)

7,000. "Directional determination of a source of sound waves." L. Mellersh-Jackson (Submarine Signal Co.). March 3rd, 1930. (348,262.)

7,602. "Electrical apparatus windings." Coventry Automatic Telephones, Ltd., and C. C. Puckette. March 8th, 1930. (348,275.)

7,851. "Measurement at a distance of electrical quantities." Aronwerke Elektricitats Akt.-Ges. March 11th, 1929. (348,277.)

7,888. "Electric time-switch." A. Friedinger. March 11th, 1930. (348,278.)

8,625. "Method of utilising an overhead electricity supply for illumination purposes by means of a neon or other tube employing suitable gas." C. J. Turner. March 18th, 1930. (348,289.)

8,876. "Electric circuit-breakers with means for extinguishing the arc by gas under pressure." S. Ruppel. February 6th, 1930. (348,295.)

9,045. "Cable suspender for electric conductors and the like." D. C. Gemmell. March 21st, 1930. (348,297.)

9,829. "Electromagnetic friction device." W. W. Triggs (Warner Electric Brake Corporation). March 27th, 1930. (348,310.)

9,833. "Apparatus for testing insulated electric cables, wires, and the like." J. Scott, and I. Sclar. March 27th, 1930. (348,311.)

9,980. "Interlock arrangements on draw-out electric switchgear." J. Swinney, and Associated Electrical Industries, Ltd. March 28th, 1930. (348,312.)

11,033. "Radio-transmission systems." Telefunken Ges. für Drahtlose Telegraphie. April 16th, 1929. (348,328.)

11,731. "Cores of compressed powdered material for electromagnetic apparatus." Harstoff-Metal Akt.-Ges. (Kametag). April 13th, 1929. (348,338.)

12,067. "High-frequency electromedical treatment apparatus." F. G. Zeileis. April 16th, 1930. (348,342.)

12,114. "Picture transmission television and like systems." Telefunken Ges. für Drahtlose Telegraphie. April 20th, 1929. (348,343.)

12,555. "Electric fires." F. E. Bancroft, H. Smethurst, G. Burrows, and Associated Electrical Industries, Ltd. April 23rd, 1930. (348,349.)

13,024. "Methods of phantomisation for telephone circuits." A. Marino. April 27th, 1929. (Addition to 283,217.) (348,353.)

13,039. "Electrical connections." Kolster-Brandes, Ltd. April 27th, 1929. (348,355.)

13,240. "Methods of making electrodes for electric discharge devices." International General Electric Co., Inc. April 29th, 1929. (348,360.)

13,902. "Cooling devices for the anodes for metal vapour rectifiers." U. Lamm, and Allmänna Svenska Elektriska Aktiebolaget. May 6th, 1930. (348,367.)

13,925. "Electric roasting and baking ovens." Maxim Soc. Anon. Fabrique d'Appareils Thermo-Electriques, and H. Hofer. May 6th, 1930. (348,368.)

13,996. "Electrically-heated ovens." M. Soloman, and C. E. Davis. May 7th, 1930. (348,369.)

14,817. "Means for suspending reflectors or shades of electric light fittings." Benjamin Electric, Ltd., and L. R. Kavanagh. May 14th, 1930. (348,383.)

15,053. "Oil-circulating pumps for electric transformers and the like." Drysdale & Co., Ltd., and J. W. W. Drysdale. May 16th, 1930. (348,390.)

15,378. "Means for indicating the polarity at any time of a horseshoe-shaped electromagnet." Tyer & Co., Ltd., and J. W. Punter. May 19th, 1930. (348,399.)

15,537. "Electrical switches with pneumatic blow-outs." S. Ruppel. May 23rd, 1929. (Addition to 336,102.) (348,403.)

15,711. "Flanges for the coils of electromagnetic apparatus." Fuld & Co. Telephon und Telegraphenwerke Akt.-Ges. May 25th, 1929. (348,405.)

16,686. "Warning tiles for underground electric cables." Albion Clay Co., Ltd., and R. Lawton. May 30th, 1930. (348,412.)

16,802. "Picture telegraph, television, and like systems." Telefunken Ges. für Drahtlose Telegraphie. June 8th, 1929. (348,414.)

17,423. "Electric accumulators." I. G. Farbenindustrie Akt.-Ges. June 6th, 1929. (348,421.)

18,170. "Plug socket connectors and adaptors used in or with electrical circuits and apparatus." A. P. Lundberg & Sons, Ltd., and G. Pegg. June 13th, 1930. (348,428.)

18,491. "Tapping clamps for high-voltage electric live lines." P. Freebury. February 14th, 1930. (348,434.)

19,251. "Glow discharge lamps." Telefunken Ges. für Drahtlose Telegraphie. July 10th, 1929. (348,439.)

19,269. "Picture transmission systems." C. Lorenz Akt.-Ges. July 11th, 1929. (348,440.)

20,116. "Supporting devices for electric motors used for driving small machines and machine tools." Siemens-Schuckertwerke Akt.-Ges. October 2nd, 1929. (348,446.)

20,830. "Valve devices for producing or receiving electric waves." Telefunken Ges. für Drahtlose Telegraphie. July 9th, 1929. (348,453.)

21,954. "Electric current-limiting device." L. Flandrin, and G. C. Levy. July 20th, 1929. (348,467.)

23,298. "Electric cables." Siemens-Schuckertwerke Akt.-Ges. August 6th, 1929. (348,476.)

24,056. "Supporting clamps for electrical overhead lines." J. W. Hofmann. August 11th, 1930. (348,478.)

28,639. "Signal indication lamps particularly for use on switchboards or control panels." Associated Electrical Industries, Ltd. September 26th, 1929. (348,493.)

Trade Mark Applications

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from May 27th, 1931:—

Dynameg (lettering and design). No. 520,130. Class 8. Instruments for testing electrical circuits.—Dynameg, Ltd., 41, Oriel Road, Bootle, Liverpool.

Tone-O-Phase (lettering and design). No. 520,793. Class 8. Radio-telegraphic apparatus, &c.—Levy's Sound Studios, Ltd., 83, Cannon Street, E.C.4.

Ardron. No. 522,307. Class 8. Radio-telephonic and telegraphic apparatus and parts thereof.—Ardath Tobacco Co., Ltd., 51, Worship Street, E.C.2.

Gustav-Ganz (lettering and design). No. 500,339. Class 13. Electric incandescent lamps (ordinary).—Gustav Ganz & Co., Vienna. (British representatives: Lloyd, Wise & Co., 10, New Court, Lincoln's Inn Fields, W.C.2.).

Luxram. No. 519,960. Class 13. Incandescent electric lamps (ordinary).—Heskel, Hasaid & Co., Windover House, Cutler Street, E.C.3.

Edolite. No. 520,627. Class 13. Electric lamps (ordinary).—Eddystone Components, Ltd., 13, Mincing Lane, Blackburn.

Benflux. No. 522,163. All goods in Class 13.—Benjamin Electric, Ltd., Tariff Road, Tottenham, N.17.

Creda. No. 516,115. Class 16. Electric lighting and heating fittings made entirely or chiefly of porcelain or earthenware.—Credenda Conduits Co., Ltd., Oldbury, Birmingham.

F.S. & Co. (lettering and design). No. 520,274. All goods in Class 17.—London Electric Wire Co. & Smiths, Ltd., 7, Playhouse Yard, Golden Lane, E.C.1.

Nomet. No. 519,726. Class 50. Turntables for use with portable radio receivers.—Plessey Co., Ltd., 56, Vicarage Lane, Ilford.

Alkydale. No. 520,183. Class 50. Compositions prepared from synthetic resin and sold in sheets, rods, bars and moulded pieces.—I. G. Farbenindustrie Gesellschaft, Frankfort. (British representatives: Abel & Imray, 30, Southampton Buildings, Chancery Lane, W.C.2.).

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alington (NR. CHORLEY).—Houses (26), Fair View estate; U.D.C. surveyor.

Alloa.—Houses (150), Broad Street district; burgh surveyor.

Aylesbury.—Grammar school extensions; Taylor & White, architects. Houses and shops, Cambridge Street, for G. S. Cox.

Barking.—Houses (63) and shops, New Street; Suburban Developments, Ltd. Billiard hall, East Street; J. Jones.

Birkenhead.—Central library and omnibus garage, Chester Road, New Ferry; R. W. Johnson, borough engineer, Town Hall.

Birmingham.—Houses (78), Perry Barr; H. H. Humphries, city engineer. Alterations and additions to Aston Commercial School (£4,850), and new technical college; Dr. Innes, chief education officer.

Bo'ness (N.B.).—Houses (44), Deanfield; burgh surveyor.

Bootle.—Alterations to Metropole Cinema; H. Liversage Goldsmith, architect, Liverpool.

Bournemouth.—School, Kinson (£11,140), for the borough E.C.; Hawkins Bros., builders.

Bredbury and Romiley (CHESHIRE).—Houses (78) for the U.D.C.; surveyor.

Brighton.—Conversion of Lord Roberts Memorial Workshops, Upper St. James Street, to cinema; Webb & Ash. School (£29,398), for the borough E.C.; F. T. Wilson & Sons, builders.

Buckinghamshire.—Casual wards (60 beds), Slough, for the Public Assistance Committee; clerk, Aylesbury. School, Cippenham (£11,000), for the county E.C.; John Deverill, Ltd., builders, Slough.

Bury St. Edmunds.—School for the borough E.C.; Mr. Mitchell, architect.

Cambridge.—Mental institution; Cambridge Corporation and Isle of Ely and Camb. County Councils.

Cardiff.—Tuberculosis hospital, Sully, for Welsh National Memorial Association; F. J. Alban, general secretary, Memorial Offices, Westgate Street.

Carlisle.—Extensions to St. Cuthbert's Church; J. H. Martindale, architect, Eaglesfield Abbey Rooms, Castle Street.

Castleford (YORKS.).—Houses (316) for the U.D.C.; Thomson and Dixon, builders, Doncaster.

Chesterfield.—Houses (64) for the T.C.; borough surveyor.

Cleveleys (NR. BLACKPOOL).—Congregational church, Rossall Road; trustees.

Colchester.—Houses (40), Old Heath, and flats, Serpentine Walk; borough engineer. School (400 places), Harwich Road, for the city E.C.; director of education.

Coseley (STAFFS.).—Houses (56) for the U.D.C.; surveyor.

Cranbrook.—Houses (40), various parishes; R.D.C. surveyor.

Crayford.—Branch library, Swan Row; Kent C.C.

Croydon.—Cinema and variety theatre, Thornton Heath, for A. C. Matthews Theatres. St. Mildred's Church (£16,000); Bodley & Hare, architects. Houses (134), Waddon, for the T.C.; borough surveyor.

Darwen.—School, Manor Road; director of education.

Doncaster.—Houses (50), Askern, for the R.D.C.; surveyor.

Dumfries.—Reconstruction of business stores, Queensbury Square (£6,000), for the Co-operative Society; secretary.

Dundee.—Omnibus station for Corporation; city architect.

Edinburgh.—Houses (446) at Stenhouse Mill, for Corporation; city architect. Preparatory school at Merchiston Castle for Merchant Co. Education Board; J. B. Dunn & Partners; architects.

Epsom.—Houses (40) and flats (28) for the U.D.C.; housing architect.

Essex.—Extensions, Leytonstone High School for Girls, for the county E.C.; J. Stewart, county architect, Chelmsford.

Fenton (STAFFS.).—Business premises, Blurton Road; A. G. Sherwin, architect.

Glasgow.—Church and hall, North Woodside Road for Finance Committee of R.C. Archdiocese of Glasgow; priest-in-charge. Workshops, motor school, &c. (£60,000), at Larkfield Garage for Corporation; city architect. School and shopping centre, Carnwadric estate; housing director.

Grimsby.—Presbyterian church, Weelsby Road, for Presbyterian Church of England Authorities; Morter & Dobie, architect, 36, The Temple, Dale Street, Liverpool.

Guildford.—Senior schools for the borough E.C.; T. R. Clemence, architect.

Hartshill (STAFFS.).—Estate development, Shelton New Road; G. Evans & Sons.

Harwich.—Houses (46) for the War Department; W. H. Gooday & Co., builders, Woodlands, Ipswich Road, Colchester.

Hornchurch (ESSEX).—Houses (41), Norman Road, for G. J. Crabb. Houses (36), Southend Road, for G. Bradshaw. Cinema theatre, Grey Towers estate, for D. J. James, Wharf House, Malt Street, London, S.E.

Irish Free State.—(ASHFORD, Co. LIMERICK).—National school; Rev. J. Laxton, parish priest. (CASHEL, Co. TIPPERARY).—Alterations to kitchen, laundry, &c., at County Home, for Board of Public Assistance; G. Beary, secretary, District Hospital, Clonmel. (CORK).—Houses (32) for St. Joseph's Commercial Utility Society (£15,000). Houses (18) for Cork Commercial Public Utility Society (£7,400). (DUBLIN).—Alterations and additions to the Mansion House for Corporation; city architect, Exchange Buildings, Lord Edward Street. (FLETCHERSTOWN, Co. MEATH).—National school; Rev. J. Corcoran, parish priest, Castletown. (WICKLOW).—Houses (16), Dunbar Road; H. J. MacPhail, town clerk.

Kent.—Improvements at Lyminge and Blean Institutions (£6,000) and nurses' home at Pembury Institution (£15,750), for the Public Assistance Committee; clerk, Maidstone. Junior school, Bexley, for the county E.C., Maidstone.

Lancashire.—New schools and alterations to existing schools at Flixton and Urmston; S. Wilkinson, county architect, 16, Ribblesdale Place, Preston.

Lanarkshire.—New schools, Chryston & Hamilton, and reconstruction of Blackwood School, for the county E.C.; John Stewart, 20, Albert Street, Motherwell.

Leeds.—Additions to civic buildings in Calverley Street; city engineer, Municipal Buildings.

Leicestershire.—Senior and junior schools, Melton Mowbray, for the county E.C.; director of education, Leicester.

Liverpool.—Bakery, Lorenzo Drive, Norris Green estate, for Messrs. Sayers; A. E. Shennan, architect, North John Street. Branch, Moss Lane and Halstead Road, for the Co-operative Society, Ltd.; E. Roberts, architect, The Arcade, Lord Street.

London.—(EAST HAM).—Nursery block, Aldersbrook Homes, for the T.C.; borough engineer.

Lytham St. Anne's.—Extension of St. Anne's Council School and Lytham Endowed School (£7,000); director of education.

Maidstone.—Housing scheme, Ringstone Farm; borough engineer.

Malling (KENT).—Houses (48) for the R.D.C.; S. L. Bundy, surveyor, High Street.

Manchester.—Houses, Heaton Park estate (127) and Victoria Avenue estate (400); also church and cinema, Baguley Sanatorium; city architect. Two schools (2,000 places), Wythenshawe; W. O. Lester Smith, director of education, Education Offices, Deansgate.

Mansfield.—Houses (50), Reindeer estate; also houses (500) during the next five years; borough surveyor.

Martley (WORCS.).—Houses (74) for the R.D.C.; surveyor.

Middlesex.—Schools, Lower Feltham (£17,900), for the county E.C.; W. J. Dickens, builder, Ealing. School, for the Roman Catholic Managers; Rev. W. J. Wood, rector of St. Lawrence.

Nelson.—Extension of Reedyford Hospital (£18,000); secretary.

Newbury.—Houses (24), Manks Lane; borough engineer.

Newcastle-on-Tyne.—Houses (103), Benwell Dene; J. S. Hetherington, contractors, 21, Benwell Grove. Houses (327), for the City Council; G. Bailey, Ltd., builders, Westgate Road. Cinema, West End; F. M. Dryden, architect, Market Street. Extension of the Eye Hospital (£2,000); secretary. Extensions to premises of Messrs. Jayson, Westgate Road; W. Hall, contractor, Derwentwater Road, Gateshead.

Northampton.—Development, Duston housing site, and extensions to Art Gallery and Museum, Guildhall Road (£3,440); borough engineer.

Paignton.—Development of Batterbridge estate; Webber and Stedham. Estate development, Clifton Road; Couldrey and Waycott.

Pembrokeshire.—Central school, Haverfordwest, and extensions to secondary school, Pembroke (£7,800), for the county E.C.

Quarry Bank (STAFFS.).—Houses (84) for the U.D.C.; A. Homfray, clerk.

Rugby.—Hotel for Ind Coope & Co., Ltd.; Thomas Lowe and Sons, builders, Burton-on-Trent.

Salford.—Exhibition hall, &c., Cross Lane; city engineer.

Slough.—Methodist central hall (£30,000); A. Brocklehurst and Co., architects, Manchester.

Somerset.—County offices, Taunton, for the C.C.; E. Vincent Harris, architect, 29, St. James' Square, London, S.W.

Stanninghall.—Extensions to tuberculosis colony; Norfolk C.C.

Stockport.—Nurses' home, Steppinghill Hospital, for the Public Assistance Committee; Peirce & Son, architects, 30, St. Petersgate. School for the borough E.C.; A. Lawton, secretary.

Stone (STAFFS.).—Alterations to Christ Church Schools, Northesk Street (£8,000) for the managers; Beckett & Bloore, architects, Granville Chambers.

Sunderland.—School; rector of St. Joseph's R.C. Church.

Surrey.—Extensions, Murray House Institution, Ottershaw, Chertsey, for the C.C.; F. J. Hodgson, architect, 201, High Street, Guildford.

Sutton-in-Ashfield.—Extensions to library, Forest Street; assistant surveyor to U.D.C.

Tadley (HANTS.).—Primitive Methodist church (£2,000); R. Goddard, builder.

Taunton.—Houses (36) for the R.D.C.; S. S. Orchard, surveyor.

Tottington (LANCS.).—Buildings for Tottington and District Co-operative Society, Ltd.; C. Horrocks, builder, Elton, Bury.

Uxbridge (MIDDLESEX).—Cinema, High Street, near Central Hall (1,700 seats); E. Bailey, Maidenhead.

Wallasey.—Shelters, &c., Harison Drive, for the B.C. (£5,189); W. J. Bradshaw, builder, 79, Northbrook Road.

Walton-on-Thames.—Houses (38) for the U.D.C.; Clarke and Son, builders.

Wantage.—Houses (34) for the R.D.C.; A. C. Whiting, builder, Nottingham.

Watford (HERTS.).—Houses (28), Hunton Bridge, for Fort Concrete, Ltd.; Stimpson, Lock & Vince, architects, 173a, High Street.

West Bromwich.—Houses (190); A. D. Greatorex, borough engineer.

Whitley Bay.—Cottage hospital; surveyor to the Council.

Wolverhampton.—Houses (90) for the T.C.; A. M. Griffiths and Sons, builders. Switchgear factory for W. de Renzi.

Woodley (CHESHIRE).—Central stores (£15,000), for the Co-operative Society; S. Broadbent, secretary.

Yeovil.—Houses (115) for the T.C.; borough surveyor.

York.—Houses (168) and flats (16) for the T.C.; F. W. Spurr, city engineer. Additions, Black Horse Hotel, Monkgate; J. J. Hunt, Ltd. Extension of the Post Office District Manager's Office; H.M. Office of Works (contracts branch), King Charles Street, London, S.W.1.